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## The Ansonia Brass and Copper Company.

HISTORY AND PROGRESS OF AN EXTENSIVE BUSINESS—ITS MILLS AT ANSONIA, CONNECTICUT, AND THE ELECTRICAL GOODS MANUFACTURED THEREIN.

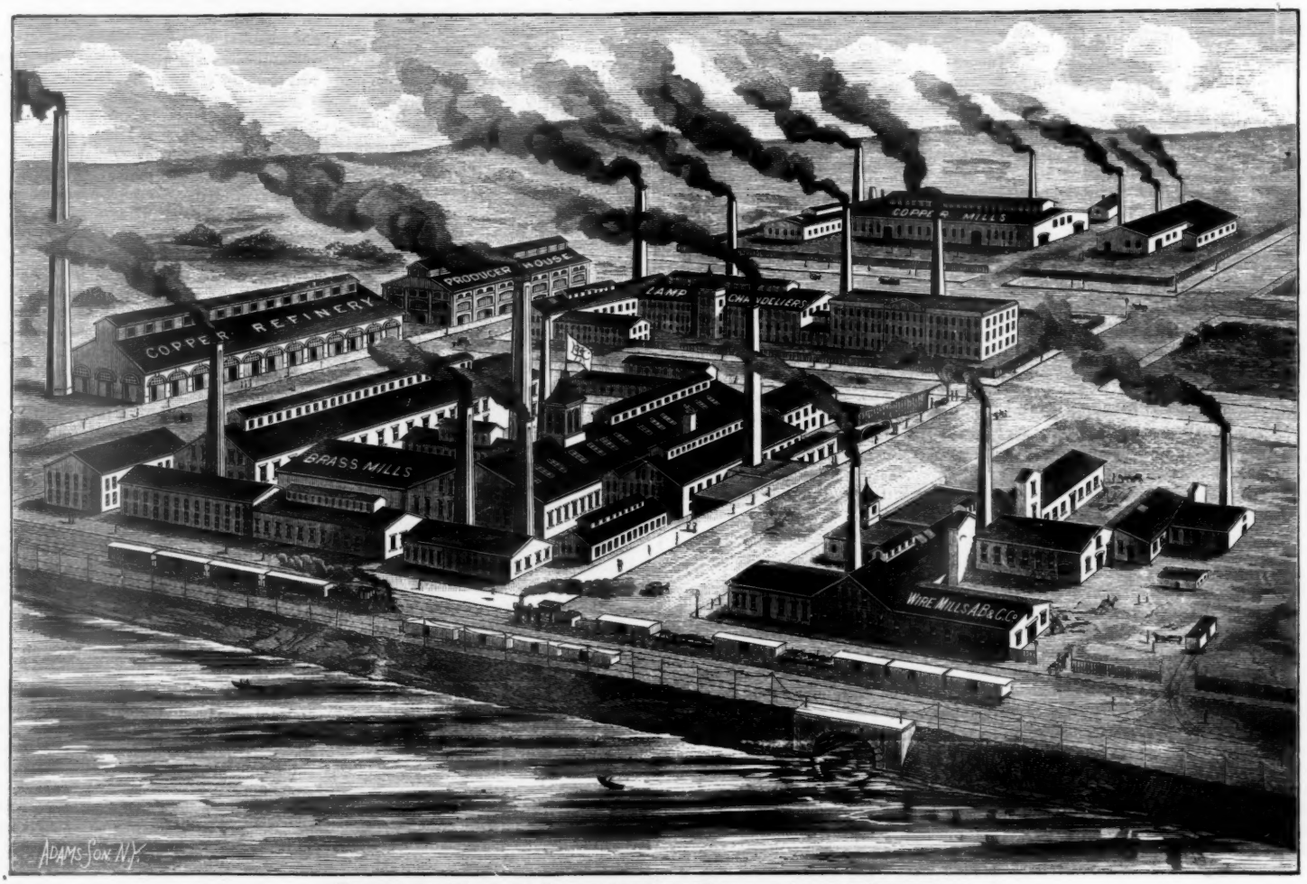
Greater advancement has not been made in any part of the electrical field than in that of making conductors. The invention of and adaptation of the dynamo machine to lighting and other useful purposes, made a heavy draught upon the skill and genius of manufacturers of electric conductors. To supply the increasing demands of the electrician and inventor it was absolutely necessary to go farther than had been done before, and to complete investigations already started by some, and ripen the experience of others by a sort of hot-bed process that would produce something to supply this demand at once. In any other country or age the wonderful results could not have been accomplished.

It will be remembered that scarcely five years ago the conductors for carrying large currents of electricity were limited almost entirely to short circuits, such as those used in electro-plating, electro-typing and work of like character, a few miles only at the outside. Perhaps not as much in the whole country as is now used by either the Brush or United States Electric Light Companies in New York City alone.

The contrast between those days and the present in this respect is great. The rapidity with which the change has taken place is scarcely realized, and the time, energy and application that the manufacturers have given to make the perfect conductor is deserving of unqualified praise and credit.

It is our purpose to give in a brief series of articles, some of the facts and history of this already extensive and growing industry.

The Ansonia Brass and Copper Company was founded by the firm of Phelps, Dodge & Co., about 40 years ago. Mr. Anson G. Phelps, in honor to whom the thriving town of Ansonia, Connecticut, has been named, visited one of the most delightful valleys of that State and bought considerable land close to the Naugatuck River, and on a canal built to furnish motive power for mills and factories that were then located, or to be located above its banks, making this section one of the most interesting and industrious in the State. The foundation of the present copper mill was laid in 1844, and as years passed and business increased, building after building was added until the present works were completed. They include a copper refinery and "slag" house combined, wherein the ore is smelted and refined for the mills.




THE ANSONIA BRASS AND COPPER COMPANY'S WORKS, AT ANSONIA, CONNECTICUT.

The copper mills contain the most modern machinery for the manufacture of all kinds of copper goods. The daily consumption of copper in this branch is fully ten tons. Much of this is worked into electric conductors of various sizes and for all purposes, from the finest magnet wire to the largest size electric light wire.

In another branch of the works the covering and insulation is done. This part of their business is in charge of careful and experienced men and the machinery used is of modern build and pattern.

Their insulated wire for magnets, telegraph and telephone use is thoroughly coated with a patented liquid insulation, which is dried and finished on the wire. It is then covered with single wound cotton or silk, or a double winding of cotton thread (in opposite directions), or with braided cotton for office wire in any size and variety of cotton required. The following are some of the advantages of their patent liquid coating. A very perfect insulation is obtained. Oxidation is prevented, and the wire and its conductivity are well preserved against the action of dampness with its destructive effect on the outer covering. The outer covering adheres to the wire, does not unwind or slip from the ends and is retained firmly in place at every part. A greater length of wire prepared in this way can be wound in a given space than by almost any other process, because the solution is an insulation which takes little space, and with it the thinnest and most delicate thread may be used.

They also manufacture all kinds of office annunciator or burglar alarm and gas fixture wire, also patented fire-proof house and

office wire for inside use in electric lighting which, is coated with non-inflammable insulation, and is furnished in white, for walls, brown for dark wood, or in any color desired.

In fire proof electric light line wire, and fire and weather proof line wire they make a high grade. Their patented paragon wire is first doubled-taped with a waterproof compound, remarkable for its durability and insulating qualities. It is then finished with a double coating of braided cotton and a patented fire-proof insulation.

Beside the insulated and covered conductors mentioned, they draw large quantities of pure copper wire in all sizes from Nos. 0 to 40. Especial care is given to this department and the result is more than satisfactory. Among the recent improvements made in telephone and telegraph wire, and one that seems to fully meet the requirements of long line telephony is a new copper wire which this house is now making in large quantities. It is known as the "Acme Bronze" wire, and the report of the tests made and given herewith will be interesting:

EXECUTIVE OFFICE, WEST. UNION TEL. CO. )
NEW YORK, December 18, 1883. )

A. A. COWLES, *Secretary:*

DEAR SIR: The following are the results of my test of the "Acme" wire sent me yesterday:

| | |
|---|---|
| Weight per mile | 110.9 lbs. |
| Resistance, Tp. 75° F. | 8.162 ohms. |
| Weight per mile ohm | 905.5 " |
| Conductivity (compared with pure soft copper) | 99% |
| Breaking strain | 360 to 365 lbs. |
| Elongation | 2% to 4% |
| Twists in six inches | 20.5 to 37.5 |

Truly yours,
(Signed) GEO. A. HAMILTON,
Electrician Western Union Co.

PRINCETON, November 10, 1883.

THE ANSONIA BRASS AND COPPER CO.:

I beg to report the result of measurements of samples of "Acme" telephone wire:

| | |
|---|---|
| Length | 102.44 feet. |
| Diameter | 0.0838 inch. |
| Resistance at 60 F. | 0.1526 ohm. |
| Resistance of standard (reduced to same diameter) | 0.15104 " |
| Conductivity as compared with chemically pure copper | 99% (98.98) |

Yours truly,
(Signed) C. F. BRACKETT,
Professor of chemistry in Princeton College.

These tests excel in strength of wire and conductivity the claims made for the new wire between Boston and this city, and it is quite obvious that the "Acme" will be largely used in the telephone and telegraph service throughout this country.

The other divisions of the works at Ansonia are the brass mills, which cover a larger area, and are equipped with machinery for making every desirable or marketable article in this line, from sheet and rods to rivets and burs; gas, kerosene, and electric light fixtures of every kind. The company also make galvanized iron telephone and telegraph wire; German silver wire for all purposes; gongs, indicators, call-bells, zinc rods, battery copper, brass strips for telephones, and brass and copper rods.

The power necessary to drive these works is derived from two sources. A system of turbine wheels, and seven large engines, furnish power to run these extensive mills.

The present officers the company are Mr. William E. Dodge, Jr., President; Mr. George P. Cowles, Vice-President and Treasurer; and Mr. Alfred A. Cowles, Secretary.

## Differences Between the English and American Patent System.

The chief difference between the English and our own system, says Bradstreet, lies in the manner of granting a patent, or in deciding on the granting of the patent. The British Patent Office is one of registration, the only examination which is carried on being that which relates to the technicalities of the application for letters patent. When the legal technicalities are all complied with, then the letters patent may be issued without regard to the novelty of the invention claimed.

In this country, we have the cumbersome machinery necessary for the examination as to their novelty of all alleged inventions for which application for letters patent is made. This involves vast expense and great trouble to the inventor without satisfactory results, for after the patent is issued here, as well as in England, it is only *prima facie* evidence that the patentee is the original inventor of the thing patented; he has no guarantee from the Government, although the Government has passed on the question of novelty, or that his patent will be sustained, and he is subjected to the chance of an interference in the Patent Office by some subsequent applicant who claims to be the inventor of the thing already patented, or to a suit for infringement by some prior patentee of substantially the same thing; or if some one makes and sells or uses the thing patented to him he must bring an action in the United States Circuit Court, where he is again subjected to the chance of his alleged invention being proven old or in common use, or of finding out after all his trouble that it has been described and published in some printed work.

So the patentee, under our American system, feels, after he has spent two years in court to establish the novelty of his alleged invention, that the examination of the Government officers at the Patent Office to find some prior invention or description to anticipate his claim was simply a farce. Now the British patentee may take a patent without reference to the novelty of his alleged invention, but when he is infringed upon he has the same rights in court that the patentee has under the American law.

## Electric Resistance of Insulators.

M. Foussereau, who recently devised the method of measuring high resistances of insulators by the time necessary to charge a condenser through them to a given difference of potential has applied the method to determining the resistance of different insulators, and his results were communicated to the last meeting of the French Academy of Sciences by M. Jamin. The resistance of porcelain is thus found to be 751 million megohms at 60 deg. Cent., and 0.052 million megohms at 150 deg. Cent. per cubic centimeter. Were a curve of resistances at different temperatures thus prepared a useful pyrometer might be the result. Sulphur gave a resistance of 7.39 million megohms at 112.1 deg. Cent., and 3930 million megohms at 69 deg. Cent. per cubic centimeter of substance. Below the last temperature its conductivity ceases to be measurable. Left to itself, the sulphur takes a vitreous texture on cooling, and on cooling to an average temperature of, say 17 deg. Cent., the resistance becomes 1170 million megohms after one day, and 705 million megohms after two days. An octahedral crystal of sulphur at ordinary temperature gave no sign of conductivity; but at 80 deg. Cent. conductivity begins to appear. Crystallization, therefore, seems to render sulphur more insulating, a fact which is worth bearing in mind. In passing to the liquid state, sulphur becomes at once four times more conducting. Ordinary phosphorus has a resistance much lower than the above substances. Solid phosphorus has a resistance of 84,000 megohms at 15 deg. Cent. per cubic centimeter, and 15,600 megohms at 42 deg. Cent. This great fall assimilates it to sulphur. The specific resistance of liquid phosphorus is 2.30 megohms at 25 deg. Cent. and 0.34 megohms at 100 deg. Cent.—*Engineering.*

## The Franklin Institute's Preparations for Their Exhibition Next Fall.

The International Electrical Exhibition, which will be held in Philadelphia under the auspices of the Franklin Institute, beginning September 2, 1884, and closing October 11, 1884, will be, it is considered, an event equal in importance to the scientific world as the Centennial Exposition was to the world in general.

The movement is now well forward. In answer to the preliminary circular sent out by the Institute some months ago, a great many responses have been received from this country and abroad. France, Germany, and Austria have sent answers. England, as yet, has not taken any great steps toward being represented. A second circular has been issued, and it is expected to bring applications for more space than the exhibition will cover.

The circular gives all the information concerning the exhibition as yet obtainable. It includes the names of the Committee of Arrangements and the special committees, the joint resolution of Congress allowing exhibitors to have their goods admitted free of duty, and the circular of the Treasury Department instructing the collectors of customs in regard to receiving the goods.

It also gives the rules and space for exhibits, regulations governing the exhibition, and the charges for space:

All spaces under 10 square feet ... $2 00
From 10 to 100 square feet .. 20c. per sq. ft.

RATE PER SQUARE FOOT.

| | | | | |
|---|---|---|---|---|
| 100 | square feet at | 20 | cents | $20 00 |
| 200 | " " | 17½ | " | 35 00 |
| 300 | " " | 15½ | " | 46 50 |
| 400 | " " | 14 | " | 56 00 |
| 500 | " " | 13 | " | 64 00 |
| 600 | " " | 12¼ | " | 73 50 |
| 700 | " " | 11¾ | " | 81 00 |
| 800 | " " | 11 | " | 88 00 |
| 900 | " " | 10½ | " | 94 50 |
| 1,000 | " " | 10 | " | 100 00 |

All spaces measuring over 1,000 square feet will be charged for at the rate of 10 cents per square foot.

General information to the exhibitors in relation to transportation, customs, regulations, patent rights, insurance, and care of goods while on exhibition are given, and the following synopsis of the classification of the exhibits: Production of electricity, electric conductors, measurements, applications of electricity, terrestrial physics, historical apparatus, educational and bibliographical, and also the general classification.

WHERE IT WILL BE LOCATED.

The lot Thirty-second and Market Streets has been secured from the Pennsylvania Railroad. The plans for the building have been decided upon. Bids will be asked shortly, and it is expected that ground will be broken in April, or, at the farthest, May next. The structure will be a temporary one, principally of wood. It is expected that for the next three or four years the Institute will use the building for the purpose of holding yearly exhibitions, and at the end of that time it is hoped that sufficient funds will be secured to erect a permanent building. Among the attractions of the exhibition, the proposed National Conference of Electricians is of great importance to scientific people. A bill is now before Congress authorizing the President to appoint such a conference, and making a small appropriation to defray its expenses, report the proceedings, and to publish the results.

The American Association for the Advancement of Science will also meet here during the exhibition; and, as the British Association will meet in Montreal shortly before, it is expected that most of the members of the latter body will visit Philadelphia and take part in the proceedings of their sister organization.

Special electrical exhibitions have been held in Paris and Vienna with great success, but this will be the first ever held in this country, and the promoters feel, no doubt, that it will equal either of the others in its attractions and success.

## The Magnetic Balance.

In a paper read recently before the Royal Society, Prof. Hughes gives an account of some experimental researches made with a magnetic balance, from which he concludes that we can find the electric conductivity of iron or steel from a simple reading of its magnetic capacity. Thus, the best Swedish charcoal iron annealed has a magnetic capacity of 525, while that of crucible cast steel annealed is represented by 84. The electric resistance of the same is respectively represented by 132 and 350.

## Dispositions of Accumulators and their Formation.

The interest bestowed in our days on the improvement of the *accumulators* of voltaic electricity invites us to present a few observations upon the sundry dispositions which may be given to such apparatus, and new instructions concerning their *formation*.

The expression *accumulators*, which now seems to be generally admitted, we have used for a long time in the following sense, to wit:

"When we consider the effects produced by secondary couples, the main properties of which we have heretofore exposed, we discover that this apparatus, although it does not directly store the electricity itself, but the chemical work of the pile, can be assimilated to those which are used, in mechanics, for the *accumulation* of the work resulting from the action of powers, such as hydraulic *accumulators*, reservoirs of compressed air, springs, so appropriately called, *secondary motors*, tackle-blocks, windlasses, etc. That manner of considering secondary couples has led us to the measuring of their *rendering*, or else ascertaining the ratio of the electrical work returned by their discharge to that of the electrical work spent for their charge..... We have found that such rendering was $\frac{85}{100}$ to $\frac{89}{100}$. After such result, we see that a secondary couple of leaden plates, properly *formed*, constitute a tolerably perfect *accumulator* of the work of a voltaic pile. (Researches on Electricity, Paris, 1879, p. 82 to 87).

We have already described, several years ago, the principal dispositions we have used. The simplest is the one which consists in rolling the leaden plates in a spiral (Reports, March 26, 1860, vol. L, p. 640); because it permits to give them a maximum of surface under the smallest volume possible, and to keep the couples in glass cylindric vessels of easy obturation (easily closed); the transparency of such vessels, moreover, allows the observation of the electrolytic effects produced inside of the couples.

Such disposition seems to us to be also the most convenient in most cases, and especially when the weight of the lead in the secondary couples is not over 7 or 8 pounds. For couples of large size, that rolling might present more difficulties, and the leaden plates, separated by insulating bands, when sinking down under their own weight might, in a long run, come in contact with one another.

Consequently we have used, in 1868 (Annals of Chemistry and Natural Philosophy, 4th series, vol. XV., pp. 10 to 13, 1868), another disposition represented by Fig. 1 herein, consisting in a series of parallel leaden plates, separated by insulating rods, and enclosed in vats with rectangular sides; the poles of the plates of even ranks being connected on one side, and the poles of the plates of odd ranks were connected on the other side.

Those plates were twenty in number in each vat, 10 of which were positive, and 10 negative. They were 10 inches long, by 10 inches wide, and $\frac{1}{24}$th inch in thickness. When the vats had no grooves inside, frames of gutta percha bands, or tarred wooden sticks, separated the leaden plates at different points of their surface, and especially around the edges.

We did not make use of this form as frequently as of the preceding one, on account of the opacity of the receipients, which did not allow as well as the other the observations of the phenomena in the apparatuses used in scientific researches; but the latter form may very well be adapted to industrial applications.

We described at the same epoch (February, 1868), a battery of leaden plates laid horizontally, having each one square yard of surface, and which, joined in a great number, could store a very large amount of electricity. This disposition would yet be very suitable, now that electricity is produced in abundance by the dynamo machines, for the stationary installations, where the spaces were unlimited. For cases in which electricity must be transported under the most reduced volume possible, the spiral form ought to be adopted in preference.

Figs. 2 and 3 represent a small apparatus, most handy to carry, composed of two secondary couples, connected by a system of commutator, which we have used several years ago. (Researches on Electricity, Paris, 1879, §114.) The vessels represented by Fig. 2 as being of glass to permit seeing the inside, are, in reality, cylinders of hardened India rubber, so that they may be less heavy and fragile. They are figured with an obturator (cover) provided with an open aperture; but that opening is only used to introduce the liquid, once for all, into the couples, and can be completely closed with a small rubber stopper; the interstices which exist around the wires connected with the poles of the couples are sufficient for the emission of gases during the charge. The liquid is always acidulated water at $\frac{1}{10}$ of sulphuric acid. The leaden plates may be separated, either by small bands of rubber, or by amianthus cloth, which is now found on the market, instead of vegetable cloth, which we formerly used.

The communications are disclosed in such a manner that, when the two thumb-screws, *C* and *C'*, for the charge, are screwed tight, the two secondary couples will be associated in quantity. To load the apparatus it will be then sufficient to press the contact posts, *B*, *B'*, (Fig. 3) against a board or *loading bench*, provided with strips of copper, acting as springs, which are in communication with the primary source of electricity.

When the apparatus is to be unloaded the thumb-screws *C*, and *C'*, are unscrewed, and the thumb-screws *D* and *D'* are screwed tight. The screw, *D*, unites the two couples in tension, and the screw *D'*, establishes the communications with a small Swan's incandescent light of the value of two candles or thereabout.

The apparatus, which we so fitted up about two years ago (Sept., 1881), constitutes *an electrical lantern*, or *miners' lamp*, to which may be added a wire cloth cover or a glass shade, either very thick or filled with water, in order to avoid any lighting of grison fire in case of the breaking of the lamp.

That apparatus can be so disposed that it may be carried about or suspended in a mine gallery.

Undoubtedly it must be reloaded once in a while, but if a certain number of lamps, so constructed, were placed in advance against the diverse pairs of springs of the loading bench, connected with the primary source of electricity, such as a dynamo-machine placed outside of the mine, the miner, when he carries back his lamp to be reloaded, will only have to take another one ready loaded, and thus the apparatus may perhaps be of practical use.

The duration of the charge, and in consequence of the lighting of the lamp, is from three-fourths to one hour, according to the surface of the secondary couples or their degree of *formation*, and could be increased yet, in measure, as the couples are more completely *formed*.

The operation which we have named, in 1872 (Reports Feb. 26, 1872, vol. LXXIV p. 592), *formation* of the secondary couples of leaden plates, consists in a previous electro-chemical preparation of those couples, the object of which is to oxidate deeply one of the electrodes, and to reduce the other into a state of metallic lead very finely divided, by means of successive changes in the way of the primary current and intervals of rest between such changes.

We wrote at that time (Les Mondes, March, 1872, vol. XXVII, p. 471). It is after all a galvanic deposit of peroxide of lead which must be produced at the expense of the surface of the metal which is impermeable, the thickest deposit possible in order to accumulate, under that form the work of the pile, and at the same time adherent enough to the surface that it may undergo, without getting loose, a series of successive reductions and reoxidations. That consideration has led us to attempt producing the peroxide of lead on the plates, at the expense of the liquid, in order to be able to accumulate a thicker layer of it, and for that purpose, to compose that liquid a salt of lead more or less watered. But with acid solutions, the lead gets decomposed, on the negative plate, under the form of crystalline needles which establish contacts with the positive plate, and, if we have recourse to alkaline solutions, the lead gets decomposed under a spongious form which rapidly increases in size, and presents an inconvenience similar to the former.

We have endeavored to perfect the *formation* by other means. We had observed that a long immersion of the leaden plates in acidulated water before the primary current, did facilitate the *formation* of secondary couples (Les Mondes, Aug. 28, 1873, vol. XXXI, p. 473) that their exposition to the air after the immersion, also produced a good result, that the water acidulated with sulphuric acid which had been used in secondary couples also facilitated the *formation* of new couples, comparatively with acidulated water which had not undergone the same process, and we had used those divers chemical means to accelerate the operation.

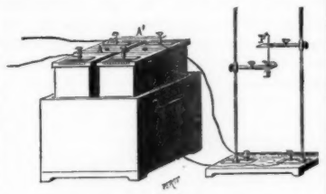


FIG. 1

We have succeeded (Reports, Aug. 1882, vol. XCV, p. 418—*La Lumiere Elecetrique*, Sept. 30, 1882, p. 332) in doing so in a more complete manner, by simply treating the leaden plates, before the action of the primary current, with nitric acid reduced by twice its volume of water.

The immersion of the metal in the acid may be prolonged for several days, not only without inconvenience, but with advantage, if the volume of water around the plates is not too large, in order not to dissolve a too great proportion of the lead. The plates get more and more deeply penetrated, even

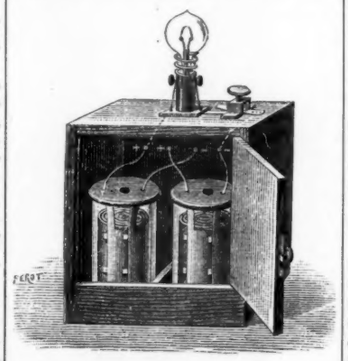


FIG. 2

when the acid, it seems, ought to be saturated, and in consequence, the subsequent penetration of the electrical action is more complete.

After the nitric acid treatment, it will be necessary to wash, in a perfect manner, the leaden plates. The penetration of the acid into the metal is so deep that ordinary water which becomes milky under the action of the azotate of lead in proportion of the sulphates, carbonates and other salts it contains, will turn turbid after having been changed fifty times, because the leaden plates abandon very slowly the particles of azotate imprisoned in their pores.

The immersion in the water acidulated with sulphuric acid of plates already washed and rolled, or united by pairs, produces afterwards a new precipitation of sulphate of lead. It would not be of advantage to leave that salt adherent to the surface or in the interior of the plates, because that adherence is only imperfect, and the salt does not make one body with the metal, like the peroxyde of lead itself. The sulphate of lead is reduced or transformed into peroxyde under an electrolytic action, even if it be energetic, only very slowly, in consequence of its insolubility, its weak conductibility, and the imperfection of the electrical contact with the electrodes.

New washings, then, are necessary after the immersion in acidulated water, to clean the plates of the salt which may remain on their surface or obstruct their pores.

Moreover, we have observed the production of that sulphate of lead in the secondary couples themselves after the action of the electrolyse for a number of years (*Les Mondes*, 1872, vol. LXXIV., p. 470). Lately Messrs. Gladstone and Tribe have made interesting observations on that subject, while studying attentively the chemical reactions produced in secondary couples. "The most superficial part of oxyde deposits, of reduced metal or of salt formed around the electrodes," we were writing in 1872, "is formed of a mixture of protoxyde and sulphate of lead, which remain

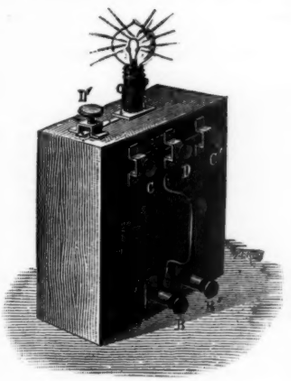


FIG. 3

adherent or fall to the bottom of the vase. Because, after a long use of the secondary couples, in the lower part of the liquid we find a powder or fine precipitated flakes, composed of peroxyde and *sulphate of lead*. The presence of the sulphate of lead, produced by the contact with acidulated water, does not prevent, in consequence of the want of aggregation of the sediment it forms, the oxydizing or reducing action to take place under its surface. . . ."

We may add that, on the points where that salt adheres accidentally in a sufficient manner to undergo the electrolytic action, it can be reduced or superoxydated; but the peroxyde and the reduced metal so obtained will get loose in a long run, whilst the peroxyde produced from the metal itself and the leads proceeding from its reduction make one body with the plates, and and always contribute to the development of the secondary current.

When the plates have been once thus prepared, the couples are submitted to the action of a primary current of an electro-motive power of three or four volts, until the apparition on the positive plate, of the brown color proper to peroxyde of lead, that which takes as much more time as the plates have been more deeply attacked by nitric acid; because, with new plates, that coloring appears almost immediately, and the peroxydation is only very superficial. Then the couple is unloaded, the current is reversed, and thus, from the first day of action of the primary source, after a few hours, discharges of long duration are obtained, which would have required several months of preparation of the couples, without the previous treatment by nitric acid.

When the positive plate is well peroxydized in the last way, under which the current has passed, and the negative plate is well reduced, the couple is left at repose for a few days, so that the peroxyde and the lead may begin to take a crystalline aggregation, which is a proof of their adherence to the plates, and subsequently the couple is again placed under a current in the reverse way of the preceding one, but not so strong, so as to prevent the detaching of the deposits already obtained.

However, when the couples are supposed to be sufficiently *formed*, and they are always reloaded in the same way, the use of too strong current is no longer to be feared. We have yet, in our laboratory, couples, the lead of which, $\frac{1}{8}$ of an inch thick only, has been used since 1860, and the plates of which, partially transformed into peroxyde of lead on one part, into reduced lead on the other, can be loaded in the same way by strong currents, without being disaggregated, and do furnish discharges so much longer as those couples have grown old for a longer time.

When we take apart well-*formed* secondary couples to examine them, we discover that the positive plates, transformed to a certain depth of their thickness into peroxydized lead, render, when they are bent, a sound similar to that of tin.

On the other part, the penetration of the electrolytic action is so complete, and modifies so profoundly the moleculary constitution of the metal, according to the way it is exercised, that plates strongly peroxydized to the point of becoming very brittle, and the color of which has turned dark brown, not only resume the dull gray color, which is a characteristic of lead, under the passage of the current in the reverse way of the one which had oxydized them, but moreover become again perfectly supple and malleable.

Those operations of the *formation* of secondary couples may appear to be difficult and minutious; nevertheless, they offer no more difficulties than those which are necessary to obtain good metallic deposits in the galvanoplastic, gold-plating, silver-plating, nickel-plating, etc.

By following the indications above given, it is possible to succeed in transforming a notable portion of the thickness of the plates nto peroxyde and reduced lead. In such case, the quantity of chemical work stored by a given weight of lead may be large enough to allow the making a profitable use of this apparatus in manufacturing trades.—*La Lumière Electrique.*

## Electric Light Changes at Worcester.

The sale and transfer of the local electric light business of the American Company of Boston to the Worcester Company was fully consummated February 2, when the latter company took possession and control under the contract. The effect of the transfer has been some changes in the mechanical management of the business. Mr. Henry M. Stevens, the general superintendent of construction for the Boston Company, who has had the entire control of the enterprise in Worcester heretofore, severs his connection with the business here to-day, and returns to Boston. His seven weeks' stay in Worcester has been very successful, and his rapid and thorough workmanship in all the contracts undertaken for the Boston Company has given general and perfect satisfaction. His place will be supplied by Mr. William H. Coughlin. It is a matter of comment that the work of the Boston Company here, under Mr. Stevens's direction, has been well done, and that not a single accident has occurred.

The electric light enterprise in Worcester is now fairly established. The station in rear of the Worcester Corset Company's building is finely and thoroughly appointed, and contains nine American and one Edison dynamos Each of the former is capable of furnishing twenty-five lights, and the latter provides for 200 lights. The aggregate number of American dynamo lights at present in operation in the city is 175, and the establishments having the greatest number of these are the Union station, the skating rink, and Denholm & McKay's Boston store. The Pleasant Street Baptist Church is the only church edifice at present using the electric light, but negotiations are pending with other religious societies for similar provision. Prominent electricians from New York, Boston, and other places, who have inspected the plant of the Worcester Company, pronounce it one of the best in the country. The Union station is undoubtedly now the best lighted railroad station in New England, and Mr. Blodgett, the electrician for the Boston and Albany Railroad Company, has inspected the lights and expressed perfect satisfaction.

M. Delarochelle has patented a novel arrangement of elements in a primary battery, of which it is reported that twenty incandescent lamps (kind and candle-power not stated) can be fed for thirty to forty hours with forty-eight elements coupled, eight in series. Experiments are being made with this battery at the Café Anglais, Boulevard des Italiens, Paris.

## ELECTRICAL AND SCIENTIFIC

The Palmer House, Chicago, is said to have a larger number of electric lights than any other hotel in the United States.

The Thomas Electric Light and Power Company, Ottawa, Ill., was licensed as a corporation January 28.

The Brush Company continue very busy in applying the new armatures to their dynamos now in use. This is an important improvement.

The Electric Lighting Company of Lynn is about to put up a brick building two stories in height 100 feet by 60. It will contain engines aggregating 400 horse-power.

Mr. A. H. Bauer, the electrician, has just returned from a trip to Europe, where he has recently been investigating electrical matters. He evidently proposes to keep in the front rank in all matters concerning electric illumination, transmission of power and storage.

The following companies have applied to the Secretary of State for increase of capital:

The American Insulator Company, of New York, from $60,000 to $120,000.

The New York Electric Supply and Construction Company, Limited, from $50,000 to $200,000.

The Elgin Electric Light Company has placed over ninety (90) of its towers in different Western and Southern cities. It has also shipped some of the towers to South America, and at the request of the governments of those countries, has lately submitted estimates for the lighting of some of the principal cities of China and Japan by their system.

CLEVELAND.—E. W. Fellows, of this city, after experimenting for two years, has succeeded in inventing a way to take instantaneous and absolutely permanent photographs upon any substance having a smooth surface by the action of electricity. The expense is less than one cent for each picture. The importance of this dicovery can hardly be estimated. It opens up an entirely new field in the art of photography, and will work a revolution in all its branches.

An apparatus for transmitting electric signals, the invention of Bruno Abdank-Abakanowicz, Paris, France, consists essentially of a magnetic pole or poles, and a relatively vibratory coil or helix adapted to move back and forth through and beyond the magnetic field, when said poles are arranged midway of the normal limit of vibration of said coil, whereby when the latter is at mid-vibration and at maximum velocity it shall be in closest proximity to said poles, and when at either extremity of its vibration it shall be most remote therefrom.

A London company has patented a device for lighting railway-coaches by means of a battery carried beneath them. It is said that the chemicals used will cost only one-eighth as much as the appliances hitherto used to develop the same electrical energy. On a trial trip a Pullman dining-room car on the Northern road was lighted brilliantly by six Swan incandescent lamps, the supply being furnished by a battery of twelve cells, the length of the battery being four feet, and the breadth and depth each eight inches. The excellence and steadiness of the light were highly commended. It was perfectly easy to read small type while the car was at full speed. After other preliminary trials, several railway companies have made propositions for the adoption of the system.

### Pending Negotiations which will Greatly Benefit an Enterprising Boston Corporation.

The American Electric and Illuminating Company of Boston is negotiating for the control of an improved system of incandescent lighting, which can be run in connection with its present arc-lighting system. In accordance with the company's policy, it will give its branch or local lighting companies the benefit of this incandescent system, which will enable these companies to virtually monopolise the lighting business in their respective fields, both for outdoor and indoor illumination, and will greatly improve the prospects and profits of the parent company, as well as the various lighting companies.

### Electric Lighting in Milan.

The theater of La Scala, Milan, is entirely lighted by the electric incandescent lamps, of which there are in all, throughout the building, 2,600, some being placed on the stage, in the boxes and even in the cafe of the theater. The Manzoni theater, of the same town, has been lighted by electricity since last September.

### Some Novel Experiments to be Made by the Electric Storage Company of Baltimore, Md.

The possibilities of electricity for lighting and other purposes are about being exemplified on a large scale in Baltimore. Mr. Morton D. Banks, of North Gay street, has introduced the incandescent electric light into his establishment. In each of his showrooms three corrugated glass reflectors are placed against the ceilings, each reflector containing three incandescent lamps. As one lamp gives normally twenty-five candle-power, Mr. Banks is able to flood his rooms with a light equal to 225 standard candles, and as one gas jet burning, five cubic feet of gas per hour, gives a light equal to but sixteen standard candles, it can readily be seen that the nine electric lights actually replace fourteen gas jets. Each lamp is independent of any other, so that, though one may fail, the others continue burning. They are guaranteed to burn five hundred consecutive hours, but a large majority of the same kind put in other places over one year ago are still in use. The electricity used for this installation is furnished from the Faure storage battery, of which so much was said by the papers a short time ago, and the patents for which are held by the Electric Storage Company, of this city, of which Mr. James R. Clark is president, Mr. C. F. Dietrich general manager, and Mr. A. H. Bauer electrical engineer.

[It will be remembered that Mr. Bauer visited Europe recently to investigate a two years' experience had by European companies with this battery.] This company have established a lighting station at 62 W. Baltimore street, where there will be about 3,000 batteries, and furnish current for lighting and power purposes. One specialty of the system is that each place lighted is entirely independent of any other. At present, the battery at the station is used to light the stores of Morton D. Banks, Lewyt & Salabes, the Franklin Bank, H. D. Cooke & Co., the elevators in the Chamber of Commerce, and the offices of the Electric Storage Company, in the same building. Should an accident occur by which one of these places is deprived of current and the lamps go out, the others are unaffected—a result impossible with any other system of electric lighting. Another feature of the system which the Storage Company will soon be ready to put into use will be the furnishing of motors for small power purposes on the same wires with the lamps. The destruction of the works of the Viaduct Manufacturing Company at Relay Station, Baltimore and Ohio Railroad, last October, who are manufacturers for the Storage Company, has delayed the introduction of these batteries, but as the factory is nearly rebuilt, work will be resumed in a few weeks, and the batteries be furnished at the rate of 500 to 1,000 per week. These batteries are charged by machines located at the United States Electric Light Works, corner Center and Holliday streets, by wires running from the works to the station on Baltimore street. The same machine that is used for the arc lamps on streets is also used at the same time to charge the batteries. The possibilities of the storage battery appear to be innumerable. For instance, four cells will run a sewing machine for one week, or for driving a tricycle for six hours; eight will drive a vehicle with two passengers for six hours; sixteen, one with four passengers for six hours; forty, an omnibus with twenty-four passengers for four hours, and fifty will drive a street car with forty passengers for seven hours; or it may be used for driving circular saws, lathes, drills, or almost any kind of machinery. Improvements are constantly being made, and the public need not be surprised at any moment to hear of some application herotofore thought impossible. Messrs. Davis and Proal are pushing the storage system forward with more vigor than the parent company, we should judge from all accounts.

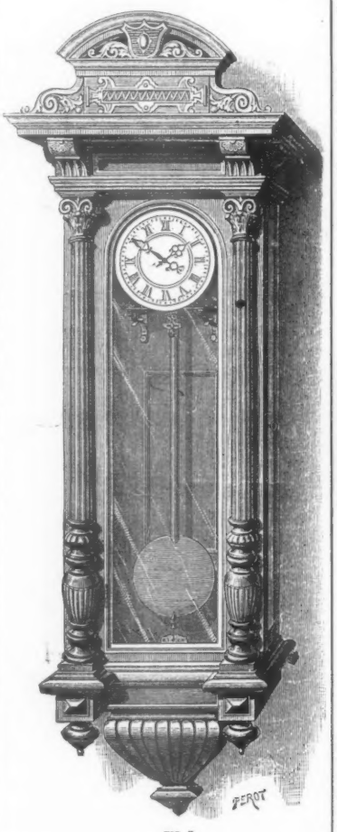



FIG. 1

### A New Electrical Clock.

Electrical clock-making, under whatever point of view it be examined, has made immense progress within a few years; nevertheless, whatsoever may have been shown by the different exhibitions which have succeeded each other so rapidly in divers cities of Europe, we are yet far from such advantageous results of which the hope had been given to us tolerably long ago.

Luckily, we are no longer in the times when clock-making was practised as an art; now the necessity of satisfying numerous customers belonging to all classes of society obliges the manufacturers to produce clocks of all kinds on a large scale, so that in large cities, and especially on the railroad lines, we feel more and more the need of having, besides clocks of moderate price and non-expensive maintenance, timepieces working with precision, and giving, above all, the similitude of time.

It would evidently be preferable to deliver to commerce only very carefully finished clocks, but it is certain that their high price would then drive away customers, and might, perhaps, discourage competition and retard progress.

Clocks moved by electricity, it seems, ought to fulfill different conditions when the matter is about clocks already constructed, or about clocks to be made hereafter.

In the first case, electricity ought to intervene only to correct slowness or fastness, without the direct action of the new organs upon the escapement wheel. The well-known solutions, more theoretical than practical, it is true, and which consist only in correcting slowness or fastness by accelerating or slowing the movement of the mechanisms, appear to be incomplete, if not worthless.

In the second place, electricity ought to act both as motor and regulator. The constructors, at the same time, have for a task the simplification of the mechanism of the clock, in order to avoid friction and assure the precise and complete action of electricity.

We must not doubt the capacity of our French clockmakers, such as Lepaute, Collin, Garnier, Breguet, etc.; each one of them evidently reserves us some surprises which shall once more show us that that branch of trade presents yet a large field of study to the inventor.

I had the opportunity of seeing at the Vienna exhibition of electricity a system of clocks, of which the simplicity of mechanism particularly struck my mind, and which answers very nearly to the second programme herein above mentioned.

The inventor, Mr. Winbauer, watchmaker at Baden, Austria, has been kind enough to put at my disposal one of those clocks, which I brought back to France, and which has for several months worked with a perfect regularity.

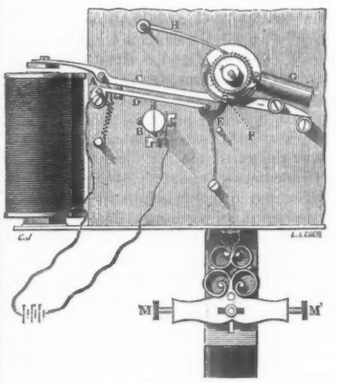



FIG. 2.

Fig. 1 gives a general view of that clock.

The pendulum is acted upon by a weight susceptible of being regulated and fixed on the escapement wheel. That weight acts as a continuous power on the wheel by its slow fall: and when it has arrived to the end of its course—to wit, about every eight minutes—a contact is established by means of a small lever. The circuit of the pile being then completed through the electro-maguet, placed on the left side of the instrument, the extremity of the large lever being attracted, raises the weight, which is then ready again to act upon the escapement wheel.

The battery of the clock is composed of two Leclanche's elements, small model, placed in a case at the top of the cabinet.

The pendulum is susceptible of a double regulating. By the means of two small horizontal screws the perfect regularity is regulated. The screw nut, placed under the lens at the lower extremity of the pendulum, works in the same manner as in all the clock pendulums.

That clock winds itself up. Electricity is used as a motor; its regular march is mainly due to the length of its pendulum, but the simplicity of the mechanism and the action of the small weight contribute also a good deal to it.

It may be understood that it would be easy, by placing on a single wire several such clocks, and getting them acted upon by a primary clock, to have a tolerably perfect synchronism.

At any rate, the clock recommends itself by its simplicity and economical construction. The cost of maintenance of the battery is very little.

The firm of Breguet & Co. has, it appears, purchased the French patent-right of Mr. Winbauer.—*From La Lumière Electr*

## TELEGRAPHIC

Superintendent Thomas Roche, of the Western Union Telegraph Company, at Boston, has resigned to accept position of superintendent of Baltimore and Ohio Telegraph Company at Boston.

J. A. Leslie, formerly assistant general superintendent of the postal Telegraph Company, at Washington, has resigned to accept position of superintendent of the Eastern division of the Baltimore and Ohio Telegraph Company at New York.

Mr. Francis W. Jones, president of the Union Electric Manufacturing Company, of New York, has accepted the position of principal electrician and general manager of circuits of the Bankers and Merchants' Telegraph Company. We do not know of any one in that field who could fill such positions more ably. The company is very fortunate in securing such talent. Messrs. Dimock, Mott, Smith, and Jones will be heard from.

It is proposed to lay the telegraph wires underground. This appears to be a waste of usefulness. At present the system serves as a municipal sunshade and umbrella. Now, if only a million or two of the wires running down any one thoroughfare were laid on the surface, they would form a corduroy road of much beauty and strength, which would recommend itself to the praise of every citizen. It is said that the Western Union, however, is opposed to this plan. The stock finds more moisture higher up.

### Telegraph Officials Appointed.

The President of the Baltimore and Ohio Telegraph Company yesterday appointed W. C. Price assistant superintendent at New York City; W. A. Schutt superintendent of the Baltimore and Ohio district service. Mr. Schutt has been until recently the New York superintendent of the American District Telegraph Company.

CHICAGO, ILL.—The Bankers' and Merchants' Telegraph Company, through their general manager, Mott, have obtained control of the Board of Trade Telegraph lines running from Chicago, *via* Springfield, Peoria and other large towns to St. Louis. Control is also secured of the Pacific Mutual Company, through which the Bankers' and Merchants' now have through connections from Chicago to Kansas City. These systems will be speedily enlarged and extended, while in the meantime the company will erect a substantial pole line between Cleveland and Chicago capable of carrying twenty wires. Ten of these will probably be strung within sixty days.

### The Bankers' and Merchants'.

The Bankers' and Merchants' Telegraph Company is making rapid strides, by securing control of existing systems as well as building new lines. It has purchased the Lehigh Telegraph line, 300 miles in length, which adds ninety new offices to its list in eastern Pennsylvania. Savannah and Charleston have already been reached, and the extension to New Orleans is proceeding rapidly, as is also that from Cleveland to Chicago and St. Louis in the West. A thorough trial is being made with the Jones quadruplex, which promises well, and if eventually adopted will largely increase the present facilities of the company. It has secured control of the Commercial Telegram Company in New York, and branch systems for stock quotations are nearly ready for operation in Boston and Philadelphia. The immediate future success of this movement is likely to hinge upon the pending suit brought against the latter company for its alleged infringement of the Calahan patents, owned by the Gold and Stock Telegraph Company. If the "Field" printer now in use is enjoined, others can be devised which will give good service, although it is desirable that the figures and letters be in separate lines upon the printed tape. An alliance has also been formed with the Mutual District Messenger Company, for the collection and delivery of messages. The Western Union Company will strive to cripple this arrangement, by bringing suit against the Mutual District, based on an infringement of that dreadful spectre known as the Page patent.

This enterprising company is now building a splendid sixteen-wire line from New York to Boston, and is also reaching out to Fall River. Its service is first class, and it bids fair to become, as, indeed, it is now, a most formidable opposition to the Western Union.

### Canadian Telegraph Lines.

OTTAWA, Ontario.—The annual report of the Minister of Public Works submitted to Parliament contains statistics showing that so far as Government management of telegraphs is concerned a very unfortunate result has been reached in Canada. The lines built have cost nearly $800,000. The expenditure last year was $55,000, while the receipts were only $27,000, showing a loss of over fifty per cent. It is true that many of these lines are in remote quarters, but even a perfect system, such as that taken over from the Western Union Company in British Columbia, shows a similar result. These lines cost $94,000; the expenditure last year was $35,000, while the revenue was only $24,000, showing a loss of $11,000. The appendix contains figures from the lines owned by the Great Northwestern Telegraph Company, of which Erastus Wiman, of New York, is president. The number of telegraph offices in connection with this, and other private lines in Canada, is 2,259, or one office to every 1,914 inhabitants, while in the United States there is only one office to every 3,700 persons. Even in Switzerland, with its dense population, there is only one office to every 2,500 persons. The number of messages sent from each office in Canada was 1,441. The report contains a letter from H. P. Dwight, the general manager, which states that in mileage of lines and number of offices in proportion to population, Canada exceeds England by nearly four to one, and that Canadian tolls are probably the cheapest in the world, taking all things fairly into account, and will still compare favorably with the reduced rate of 6d. shortly to take effect in England. The Great Northwestern Telegraph Company sends ten words 1,200 miles for 25 cents, and between all towns within twelve miles distance for 15 cents.

### Telegraph Competition.

Every effort is being made to convince the stock dealing public that the new symptoms of activity in the Baltimore and Ohio Telegraph Company are but the prelude to a consolidation with the Western Union. The only thing that looks like evidence of an approaching consolidation is the fact that a few of the heads of the departments in the Western Union have been taken into the Baltimore and Ohio Telegraph system, but they and President Garrett, of the Baltimore and Ohio, deny positively that there is any such significance in these appointments. The past history of the Garretts and their railroad, discredits this talk of consolidation. During the boom of a few years ago, which was taken such liberal advantage of by a few scheming adventurers and confidence swindlers, who sold tens of millions of stocks to the public at par which cost them absolutely nothing, great exertions were made by Mr. Gould to get possession of a majority of the stock of the Baltimore and Ohio Road. No corporation in the country offers a finer opportunity than this for a repetition of such stock watering as Mr. Gould achieved with such brilliant success, in the case of the Elevated Roads, the Western Union Telegraph, the Missiouri Pacific and the Wabash. The Baltimore and Ohio has never watered its stock, and its books now show a surplus of $14,000,000 on $15,000,000 of stock. The chances that "the right kind of man" could carve out of the assets of so sound a concern, in the way of leases, consolidations, guarantees, purchases of subsidiary lines by the directors to be sold or rented at an advance of hundreds per cent. to the stockholders, extensions, and a construction company, winding up with the issue of a stock dividend of 300 per cent. to be sold to the lambs at par, were clearly seen by Mr. Gould who thought himself the right kind of man; but the Garretts refused to trade with him, and this glorious opportunity was never realized. The Garretts and the Baltimore and Ohio were associated with Mr. Gould in the American Union, but when he consolidated that enterprise with the Western Union they refused to go in. They had been shrewd enough not to tie up the Baltimore and Ohio Telegraph with the American Union in any such way that they could not cut adrift when they wanted to, and when they found that the American Union meant consolidation instead of competition they parted company with it.

Mr. Garrett now asserts positively that it is the intention of his company to push the development of its telegraph system as rapidly as possible to an active competition with the Western Union at every important point where commercial business is done—from Boston to Bismarck and from Winnipeg to New Orleans. Wires, poles cross-arms, and other material have been contracted for; twelve more wires are to be strung at once between New York and Chicago. These statements are definite, and the records of the man and the company entitle them to credence. The new lines, like the old ones, are to be built for cash, and no watered stock is to be put out against them.

"When Mr. Gould was associated with us," says Mr. Garrett, "in the American Union, he used to argue that the stock of the Western Union—then only $41,000,000—was so enormously over-capitalized that the opposition could earn dividends at rates that would not pay the Western Union. Now the stock of the Western Union has been watered up to $80,000,000, plus its cable guarantees, Mutual Union guarantees, and other similar obligations," and Mr. Garrett thinks the argument that was good for the success of the American Union is good for that of the Baltimore and Ohio. The present Atlantic Ocean cables have a capitalization of $80,000,000, representing perhaps $30,000,000 of actual investment. The cables to be connected with the Garrett system will be new and perfect, and will represent a capital of only $5,500,000. If there is to be competition, such as this between hard cash and watered stock is what the country wants to see. If the promise of competition ends as it has so often, in consolidation, the event will furnish fresh arguments for a postal telegraph.

### The "Merchants'" New Electric Lighting Station.

The 1,000-light station of the Merchants Electric Light and Power Company on Congress street, Boston, Mass., is very rapidly approaching completion. In the casement, the boilers are in place, and the pipe connections are nearly completed. The next floor above, which has been provided with a super floor, or "crib," in order to prevent jar, is to be devoted exclusively to engines and dynamos, twenty of the former and forty of the latter being required. The large battery of boilers requires an enormous chimney, seven feet in internal diameter at the base, which towers high above the surrounding buildings, and has become a conspicuous landmark. It is safe to say that in perfection of arrangement and thoroughness of equipment and construction, this lighting stands without an equal in the world. It has much attraction for electrical experts, a number of whom have inspected it very critically, and in every instance they have conceded that nothing had been left undone to make it perfect. The Merchants' Electric Light and Power Company expect to open this new station in the latter part of this month.

### Mr. Mackay on His New Cable.

Mr. John W. Mackay makes the subjoined interesting statement of the progress so far made with the construction of the two cables which he, in concert with Mr. James Gordon Bennett, proposes to lay from Europe to the United States. Since Mr. Jay Gould became master of the Western Union Telegraph Company, and in that capacity made an alliance with the controllers of the existing system of Atlantic cables, the desire to escape from the necessity of using lines even indirectly controlled by Mr. Gould has been growing strong in the United States:

No. 9 RUE TISLITT, PARIS, Jan. 19.

SIR:—For some time past there have been published in many of the London papers, and notably in the *Pall Mall Gazette*, a series of sneering articles about the Transatlantic Commercial Cable Company, in which Mr. Bennett and myself are interested.

I do not know whether these articles have been inspired by professional promoters of companies, or by persons interested in the cable companies now existing. It is, however, of little consequence who is at the bottom of these articles; but in the interests of the general public, the press, and of the merchants who use the transatlantic cables, I think that a few words from me will not be out of place, with a view to correcting possible misapprehensions.

The *Pall Mall Gazette* of Jan. 16, for instance, says: "There is some mystery about this matter, and the part which Mr. Mackay is playing in the combination seems to require some explanation. It is a very big business, and may have great results one way or the other. It is possible that when the scheme appears the name of Bennett may not be quite so prominent as people have been led to expect."

Sir, I ask leave to state publicly in the columns of the *Times* that there is no mystery about the matter at all, nor, indeed, has there ever been any. Mr. Bennett and myself ordered last September two cables from Messrs. Siemens. Any persons interested in obtaining further information about these cables can procure it at the business office of Messrs. Siemens, No. 12 Queen Anne's-gate, Westminster. Suffice it to say here that about 1,000 miles of one of these cables have been completed, and the steamer Faraday leaves before the end of this month with this portion of the cable on board, of which it will lay a part to connect Dover Bay and Cape Ann, Massachusetts, and the remainder from Dover Bay eastward.

On the completion of this work the Faraday will return to England, and will leave again by the end of May or the beginning of June to complete the first line of communication between England and America. The second cable will be laid in course of the Summer.

We own both cables ourselves, and we intend to keep them. We have no intention of entering into any agreement or coalition whatever with the existing companies.

Owning the cables ourselves, and not being required to satisfy the wants of small shareholders, who, having but small capital at their disposal, are obliged to expect quick returns, and clamor for mercy for their "one little ewe-lamb," we are in a position to take our stand and defy all attempts at coercion.

In founding this new transatlantic cable company we were of opinion that the time had come to give the public on a permanent basis a somewhat cheaper and at the same time a thoroughly reliable and prompt cable service. We have not started on this enterprise in order to strike the existing companies, or with a view of entering into a systematic war of rate-cutting.

The above is a brief statement of our objects and intentions clearly defined. I have also stated how far the mechanical part of the enterprise has progressed. I do not deny that "it is a very big business," and I hope that it may have "very great results," but I do not see that there is any "mystery" in it whatever. Your obedient servant,

JOHN W. MACKAY,
President of the Commercial Cable Company.

# Telephonic News

Telephone stocks are advancing daily since the annual reports have been made, showing the immense growth of business during 1883.

The net earnings of the New England Telephone and Telegraph Company for December shows a gain of $4,000 over November.

The affairs of the old Mexican National Telephone Company have been wound up, and shareholders are entitled to thirty-eight cents per share on surrender of the shares to A. E. Dennison, trustee, room No. 12, Equitable Building.

Mr. H. F. Kellogg, for the past five years connected with the Telephone Dispatch Company at Boston, sailed last week for Lima, Peru, he having accepted the management of a large territory for the West Coast Telephone Company.

HUDSON.—At a meeting of the Hudson River Telephone Company Feb. 7, the following directors were chosen: James Bigler, Theodore N. Vail, Charles R. Truex, Andrew B. Uline, Chas. S. Beardsley, Dexter A. Smith, and H. L. Storke.

Mr. Graham Buckley, assistant general manager of the London and Globe Telephone and Maintenance Company, arrived in the steamship *Britannic* on the 6th instant. Mr. Buckley reports the general telephone business on the continent in excellent condition, and especially in London.

*Washington, D. C. Feb.* 4, 1884.—In the telephone interference case now pending in the interior department, the secretary has refused the appeal of Drawbaugh to have certain parties thrown out of interference. He holds that Drawbaugh's application is for an invention substantially the same as that embraced in the patents of Blake and Edison, and that the question of prioritoy of invention between the parties must be determined by the interference proceedings.

### Demand for the New Insulator.

The Chicago Insulating Company are doing a remarkably fine business with their new insulators. The demand for their goods, and especially the Fiske-Mott corrugated pole insulator, is exceedingly brisk. The company are pushed to their utmost capacity to supply this demand, and are now making their new insulators from glass, as well as from the superior composition that have made this house a success from the beginning. The insulators are now being used largely by electric light companies, and wherever high insulation is desired.

We are indebted to Professor George P. Grignard, chief electrician of the Société Generale des Telephones, for the following interesting statistics of telephone business in France to the 1st inst.:

| | *Subscribers.* |
|---|---|
| Paris | 3,328 |
| Bordeaux | 307 |
| Havre | 192 |
| Lille | 138 |
| Lyons | 510 |
| Marseilles | 361 |
| Nantes | 132 |
| Rouen | 84 |
| Calais | 91 |
| Total subscribers | 5,143 |

The average calls per subscriber per week in Paris was, during last month, 37. This company has gained 1,047 subscribers during the past year in France.

### Portland Wants to Use Telephones Without Charge.

PORTLAND, ME.—At the meeting of the City Council, on the 4th instant, an order drawn by Major Deering was introduced, directing the New England Telegraph and Telephone Company, in view of the privileges granted it, to furnish and maintain free of cost all telephone instruments now in use by the city. An order somewhat similar to this was adopted last spring, but was not acceded to by the company, and the Mayor initiated this action in order to secure a settlement of the question, as bills have been presented by the company. At the present time there are eleven instruments in use by the city, two of which are furnished free of charge, while those in use by the Fire Department are charged at the rate of $30 per year, and the balance is $45. After debate, a committee of two aldermen was appointed to secure such terms of the telephone company as they can. At present the telephone company has 70 poles erected in different parts of the city; the Western Union Telegraph Company, 87 poles; and the Electric Light Company, 30 poles, and no previous requests or provisions have been made with any for free service.

### Why the Thing Wouldn't Work.

A young gentleman entered a newspaper office on Walnut street and asked if he might use the telephone.

"Certainly," replied the suave city editor.

"I live in Dayton," he replied, "and I want to telephone to my wife for a little money, as I'm unexpectedly short just now."

"I've been there myself," remarked the city editor, "and can sympathize with you. You may talk the box clear off of the wall if you want to."

"Thanks," he said, and rang for Dayton. He got it, but failed somehow to get a satisfactory reply. He talked low, and he talked loud, and then he howled. He spelled the words out slowly and repeated them again and again. His appeal was full of the words "broke," "money," "can't hear," "speak plainer," "send," "sober," "want to go home," and so on, but he was signally unsuccessful in getting a fitting response. Finally he hung up the tube and remarked:

"You will excuse me, I hope, for troubling you, but this result is unavoidable and unexpected, sir. The circumstances are peculiarly unfortunate, sir. My mother-in-law is at the other end of the wire, and no wonder the thing wouldn't work. Good morning, sir!"

### Rapid Progress in Louisiana—Extra-Territorial Lines.

The telephone service is being gradually yet steadily extended throughout this section. This means of inter-communication is growing daily more popular, and has already proven of the greatest service to those who have been sufficiently energetic to grasp its facilities and resulting advantages.

This city is being telephonically connected with the principal adjacent towns, and further extensions are in progress. The telephone company now has lines out of New Orleans to Hahnville, Edgard, St. James, Donaldsonville, Bayou Goula, Plaquemine, Port Allen, Paincourtville, and Napoleonville; from Shreveport to Red Chute and Bellevue; from Vicksburg to Anthony's Ferry (Cardiff); Haynes' Bluff; Satartia and Yazoo City; from Bayou Sara to Jackson and Port Hudson, and to Woodville.

Additional lines are being constructed from Jackson to Brandon, and from Jackson to Vicksburg. Also from New Orleans to Kennerville, and to Baton Rouge and Port Hudson. Other lines are in contemplation.

Our most wide-awake merchants aré paving the way to a large business by telephone with the towns so conveniently connected; indeed, the business is at times so large that the telephone company is seriously contemplating the provision of additional facilities. Quite a number of our most progressive sugar planters have placed their plantations within call, much to their convenience and profit. The telephone company has ordered a fine wire cable for the Lafourche, at Paincourtville, and when this is received communication will at once be established with Napoleonville.

The energetic manner in which Mr. Marrs, the vice-president, and Mr. Huck, the manager, are pushing the work of construction out of the city and of reconstruction within the city, receives favorable comment. They will soon connect New Orleans with Port Eads by telephone, and thus add to the commercial conveniences already provided.

The Iowa and Minnesota Telephone Company held its annual meeting on Friday last. The following were elected as the Board of Directors:

J. K. Graves, Dubuque; G. W. Gable, A. F. Cutter and J. T. Lane, Davenport, O.; W. G. Peaslee, Dubuque.

The Board of Directors met and elected the following officers:

President—J. K. Graves.

Vice-President—J. T. Lane.

Secretary—W. G. Peaslee.

Treasurer—G. H. Harris.

A committee was appointed to confer with the Iowa Union Company, of Davenport, to perfect a consolidation of two companies.

Almost the entire session was devoted to the discussion of the extension and improvement of the lines, and a committee, consisting of Messrs. Graves and Keim, was appointed to recommend such extensions as they thought advisable.

The meeting then adjourned subject to the call of the president.

### New Telephone and Telegraph Companies.

ALBANY, N. Y.—An examination of the records in the Secretary of State's office shows that within the last three years the number of companies incorporated under the Telegraph Companies' Act is 125 district organizations, with capital amounting to $225,000,000. This includes numerous telephone companies, some of local character, and also schemes for the promotion of every phase of electrical contrivance for the transmission of intelligence. In no other single line of activity do the records of the Secretary of State show anything like the competition illustrated by these figures. This condition of things will be of interest, in view of the discussion at Washington as to whether the Government shall go into the telegraph business.

### The Cumberland Telephone and Telegraph Company.

This company under its present management is now making an excellent record and seems to be reaching out in all directions for and developing new business at every point. We will soon be able to present to our readers an interesting statement showing the growth of Nashville business under the personal direction of Mr. E. T. Baker, the secretary and treasurer of this company. They have just commenced to build a small exchange at Franklin, Tenn., starting out with about fifteen subscribers. They are connected by a trunk line seventeen miles long with the Nashville Exchange. As soon as the weather will permit they will commence to build a through line from Nashville to Shelbyville, Tenn., fifty-five miles long, of number ten wire, and will start an exchange there and run lines from there to Wartrace, Tullahoma and Lynchburgh, thus bringing an extensive business tributary to Nashville directly to their Nashville subscribers, communication with whom from Lynchburgh has been only by stage-coach and railroad. They will soon build a line to Gainesboro: seventy-five miles from here up the Cumberland river, a fine country heretofore cut off from the outside world except by the slow facilities the irregular boats could afford.

Their little exchange at Union City, Tenn., started three months with ten subscribers, has grown to forty-six, with a prospect of sixty before long. Lines will be built from there to all the neighboring towns of importance. We predict that Memphis and Nashville will show a remarkable growth in the next six months.

A telephone office has been opened in Calabazas, Lower California.

### Telephones Said to Improve the Hearing.

It appears that many people who have telephones in their houses or places of business, and use them frequently, find their hearing bettered. The best testimony, however, comes from the central office. At each switch-board sits an operator, generally a girl, who from morning till night haggles with unreasonable subscribers, and patiently goes through the everlasting formula till her head fairly rings with "hello" and "all right" and "go ahead." She gets small pay for her trying work, surely not a sufficient compensation for loss of hearing.

But her testimony is that her hearing is constantly improving. When she began this work she blundered sadly; now the ear is drilled to catch the faintest sound, and her sense of hearing is remarkably acute. It must be noticed that the regularity of this schooling of the ear is largely responsible for the good result. If an operator were to take a switch-board only one day in the week and do all the work required on that day, the practice would doubtless be detrimental, because it would be exhaustive to both the muscular and nervous make-up of the ear. The systematic use of the telephone seems to develop the hearing above its normal acuteness, but does not make it technically abnormal.

One benefit from using the telephone is evident to both subscribers and central-office operators, that of cultivating the attention, a process which is reckoned as the third or intellectual method of developing the sense of hearing. A good share of the difficulty which people find in working the telephone, comes not from any defect in the machine, nor from any deficient hearing, but from inability to fix the attention on what is heard. This trouble readily disappears by practice in listening closely to what is said over the wire. Indeed, the attention may be trained to an abnormal development, as in the case of the head operator at the central office, who has been in the telephoning business for four years; she has so accustomed herself to fix her attention on the machine before her and to abstract her attention from her surroundings, that when she is in her home she often fails to hear when she is addressed by members of the family.

### Bell's Telephone Rights.

AN EXPERT PATENT EXAMINER ON THE PHILADELPHIA DECISION.

NEW YORK.—Recently *The Press* correspondent met Mr. Zenas F. Wilbur, for many years an expert patent examiner in the Interior Department. As the original Bell telephone patent had been granted on his official recommendation, he was asked what the effect of the Overland Company's Philadelphia victory over the Bell Telephone Company would be. He said:

"For the time being a natural depression will follow. I haven't a dollar's worth of stock in any telephone, but if you wish I can give you some points in this problem not understood. So far as the Patent Office is concerned, the telephone principle might have been discovered by Adam, but if they neglected to get a patent before Mr. Bell their rights are merely those of equity, not law. Mr. Bell had been possessed of his patent for two years before Mr. Drawbaugh appeared on the scene, and then, of course, so far as the department was concerned, all rights of Drawbaugh had been precluded. But that, after all, taking matters as they are to-day, is of small consequence. The Overland Company, or any number of companies, may get decisions in their favor as against the Bell telephone monopoly, and I don't care how many of them do, but, when all that is done, they are simply confronted with two strong facts which they will have to dismantle before they can enter in and enjoy the open field of competition."

"What are these?"

"Well, in the first place, the simple telephone patent granted to Bell on the merits of a new principle in physics is only a frac-

tion of his other grants. I presume he has fifty more, all of them covering the various methods by which the principle itself is made available and perfect in its practical application to a vast variety of details. Of these the Blake patent is the most important. But all are of value to a complete telephone system. These patents will all have to be combated and overthrown before the anti-monopolists can get standing room in the business. You can calculate how much time all this will be likely to consume.

"But the other obstacle is more serious than this. For the past few years Mr Theodore Vaile, superintendent of the Bell Company, has made it his business to travel all over the country, obtaining a controlling interest in the telephone exchanges in every direction. With these he has made what he calls perpetual contracts, the terms of which bind the various companies to the use of the Bell patents in royalty for a term of years; irrespective, mind you, of any and all action of the courts as to the value of these patents themselves. For instance, they have such a royalty contract with the Lowell Syndicate covering the New England States, from which they receive a quarter of a million annually, and so it is everywhere.

"Hence these natural queries: What good will any number of injunctions do if you can't command the apparatus to make their value, and what good would the apparatus do if the business you want to reach is blocked by prior contracts extending for a term of years?"

### Dining Telephone Men.

The Elliott House, New Haven, Ct., on Friday last was the scene of a banquet at which all the officers of the Southern New England Telephone Company met and fraternized with the general managers of their different connections throughout the State. It was the occasion of their sixth anniversary, and one not to be easily forgotten by those present.

At the close of the feast Mr. Morris Tyler, president of the company, made a pointed speech, in which he said that the gathering was an informal one with the idea that all should become acquainted with one another. Mr. Tyler reviewed the history of the company, and thanked the managers in the name of the directors, saying that in no instance had they failed in their duties.

Mr. Tyler said that six years ago Mr. Frost, the present general manager of the company, knew nothing of the telephone business, and was advised to give up his toy. Mr. Tyler stated, as evidence of the growth of the company's business, that in February, '78, the receipts of the company were $250; in October, '83, $28,283.28, and that in the first week of the present year they were $16,047.29. Mr. Tyler's speech was warmly applauded, and was followed by happy speeches suited to the occasion.

The following gentlemen were present: Morris Tyler, president, New Haven; A. H. Embler, secretary and treasurer, New Haven; H. P. Frost, general manager, New Haven; Wilbur F. Day, director, New Haven; E. B. Baker, general superintendent, New Haven; George E. Betts, district superintendent, Bridgeport; J. Jepson, district superintendent, Norwich; A. M. Young, district superintendent, Waterbury, C. W. Coe, district superintendent, Norwalk; L. H. Frost, superintendent, construction, New Haven; J. H. Butler, superintendent construction, Stamford; W. P. Frost, superintendent construction, Hartford; E. N. Clark, business manager, New Haven; W. H Fairchild, manager operating department, New Haven; George H. Coe, business manager, Hartford; W. N. Sperry, manager, Birmingham; M. P. Dowe, manager, Danielsonville; G. W. Hoyt, manager, Danbury; H. C. Boswell, manager, Greenwich; W. G. Riggs, manager, Meriden; H. D. Goodrich, manager, Middletown; C. W. Kellogg, manager, Mystic; L. H. Fuller, manager, Putnam; J. Bills, manager, Southington; C. K. Hunt, manager, Winsted; George W. Phillips, manager, Willimantic; U. S. Crofut, manager Inter-State lines, Providence; A. F. Lincoln, electrician, New Haven; E. Pitman, foreman inspectors, New Haven; F. A. Allen, inspector, New Haven; George W. Clapp, chief clerk, New Haven.

The following were the invited guests: Mr. Mackintosh of Hartford, W. J. Denver, manager Western Union, Springfield; A. H. Kellam, New Haven; G. L. Reynolds, New Britain, and H. Pendleton, Guilford.

### Iowa's New State Capitol Building.

CHICAGO, January 28, 1884.

*Editor Electrical Review:*

Business calling me to the city of Des Moines, the enterprising capital of Iowa, I spent part of a day in visiting the new capitol building now approaching completion, and in which the State legislature met for the first time on January 17, 1884.

This capitol is certainly one of the finest buildings in the whole country, and will stand as a lasting monument to the combined skill of the architect who designed it and of the artisans and mechanics who so intelligently carried out his plans.

It is built of Missouri yellow and gray stone on a granite foundation, is 363 feet in length by 240 in width, and 92 feet in height to the top of the cornice; to the top of the ball over the main dome, 295 feet. The edifice cost $2,362,531, and is situated on a commanding hill overlooking the entire city and a large area of surrounding country. Mr. Bell, until his recent appointment as United States architect, was the architect in charge; Mr. R. S. Finkbine is the able and courteous superintendent of construction.

Arriving at the capitol, we were kindly taken in charge by General Ed. Wright, Secretary of the Board of Capitol Commissioners, who kindly escorted us over the building; and, knowing that your readers would be particularly interested in the electrical fittings of the edifice, we took especial note of this part of the work.

Passing into the magnificent legislative halls, I found that the desks of the individual members, as well as those of the Speaker, clerk, and other officers, together with the different committee rooms, were all connected to electric annunciators placed at the ends of the halls, each desk and committee room being provided with a push key for the purpose of calling pages.

To those who have seen, in the midst of an exciting debate, members violently pounding their desks and snapping their fingers in fruitless endeavors to secure the services of a page, the advantages of an electric system of calls, whereby the noiseless pressure of a push button secures the prompt attention of the desired messenger, will be very apparent.

Such a building as this would, of course, be incomplete without electric gas lighting, and the elegant chandeliers in the House and Senate Chambers, as well as the many circles of burners, flash into dazzling brilliancy by a single touch of a key, and light up the magnificent dome to a height of nearly three hundred feet.

The clocks throughout the building are all operated by electricity, thus insuring absolutely uniform and correct time in the different departments, the dials in the House and Senate Chambers being marvels of elegant design and workmanship.

One of the most interesting features of the building yet remains to be described, and that is its telephone exchange.

In one end of the edifice a complete telephone exchange has been fitted up, with connections with all the rooms of the building, and by means of trunk lines with the Des Moines city exchange, and through the latter to all the exchanges in the State.

It is wonderful to think that by means of electricity a Member of Legislature, who is about to be called upon to cast his vote for or against a certain bill, can, without leaving his committee room, not only confer with another member in another part of the building or city on the subject, but actually discuss the *pros* and *cons* of the measure with a constituent in the district which he represents, miles away.

Proceeding through a tunnel under the capitol square and adjoining street, we emerge in the boiler house and engine room, which is connected by Patterson cables with the telephone exchange, the time dial in the engine room being operated by the regulator controlling the clocks in the main building.

Here, too, is an electric annunciator, which indicates the height of the water in each of the tanks in the main building, and which instantly sounds an alarm when the tanks are full and pumping no longer necessary.

The efficiency and satisfactory performance of the above described electrical apparatus are entirely due to Mr. John Young, of the Western Electric Company, under whose supervision the work was done, all the material—excepting, of course, the telephone—being furnished by the company with which he is connected. TRANSMITTER.

### Kansas City and Northwestern News.

KANSAS CITY, MO., Jan. 30, 1884.

The demand for new telephones at this exchange still continues, forty having been put in since January 1st, and as many more made application. The advantages of the telephone have never been fully appreciated in the past in this city; but now that the service has reached a state of efficiency never before attained, there is excellent prospect of a healthy growth during the year. The "extra territorial" calls have also increased from month to month, and now the lines from here to Topeka, Lawrence, St. Joseph, Atchison and Leavenworth have all they can carry during business hours. The business between Kansas City and these points alone has increased from $215, in September, to $454, in December, so I am informed, more than doubling in three months.

Telephone people of the West will universally regret to learn that Mr. Frank B. Knight has retired from the special agency of the American Bell Telephone Company, of Boston. Few men possess his excellent business methods, coupled with such rare good nature—to say nothing of good looks—and his cheerful presence was always welcome in telephonic circles. That he has joined his fortunes with the Palmer Wire Company, of New York, leads to the belief that he is not lost forever to the telephone world, but rather that the Palmer Wire Company will have a greatly increased patronage from telephone men. In this neck o' woods all unite with me in wishing that abundant success may follow him.

Col Geo. L. Beetle, of the Western Electric Company, recently honored the West with a visit, leaving with an increased admiration and appreciation of its growth and prospects. He spent a portion of his time in Topeka, the guest of Hon. John R. Mulvane, the vice-president of the Missouri and Kansas and United Telephone companies.

If more of the eminent electricians would follow the example of Mr. Thos. D. Lockwood, of Boston, and through the columns of your wide-reaching REVIEW give the large number of young men just entering the field of electrical science the benefit of their experience and knowledge, the effect would be to vastly increase information in this new and rapidly-developing field, and thereby benefit not only this particular class, but indirectly whole communities. In your issue of January 10, Mr. Lockwood very neatly disposes of some of the arguments of an unknown "prominent electrician," and also shows up the fallacy of the arguments against the use of electric conductors and illuminants; January 17th he pays his respects to Bi-Polar, and so clearly and satisfactorily makes his point that Bi-Polar's hat is hereby doffed. The point I desire to make is, that Mr. Lockwood correctly appreciates the need in this field, and that he should never hesitate to present the results of his experiments and research as long as this course is consistent with his own inventive rights.

At a recent meeting of the Executive Committee of the companies, the office of auditor of the Missouri and Kansas and United Telephone companies was created, and Charles H. Maclilie appointed auditor. Mr. Maclilie has been with the Missouri and Kansas Company since its organization, and is a competent and deserving young man.

About one month ago, when there were in the neighborhood of 450 telephone sets in use in this city, the record of telephone calls showed an average of 7,000 a day. Over fifteen calls a day is a pretty good average for each telephone, is it not?

A communication was addressed to Chief Hale, of the Kansas City Fire Department, recently, asking his opinion of the telephone as a fire alarm. His opinion was desired by an official in a city where a fire alarm system was to be put in. His reply was as follows:

DEAR SIR: In reply to your inquiry concerning the telephone as a means of giving fire alarms, I am pleased to state that I find it satisfactory in every respect, and I think it superior to any other. I have not the slightest hesitancy in recommending the telephone for this purpose. There are no surer signaling systems, and the alarm from a telephone always gives the exact location and character of the fire, instead of merely indicating the block or signal box location, as is the case with other fire alarm systems. The citizens here, as a whole, are well satisfied with the telephone alarm, and I hear no complaints. I think the time will come when the telephone will be everywhere recognized as the surest and quickest fire alarm appliance known. Respectfully,

GEO. C. HALE,
Chief, Kansas City Fire Department.

T. P. Vaille, so long the general manager of the Denver Telephone Company, has resigned, and his place filled by Mr. Field, formerly superintendent of the operating department, and a very fine telephone man.

The Atchison, Topeka and Santa Fe Railway Company is just completing a building for its general offices in the city of Topeka, the building costing upwards of $100,000. They are having put in by the electricians of the Missouri and Kansas Telephone Company a very elaborate private line telephone system and hotel annunciators, connecting the office of the general manager, by wire, with all the heads of the various departments, so that any of these officers can be instantly summoned or communicated with. Errand boys can be called in the same way. The office wires are all being put in before the plastering is put on, so that not a wire will be visible when all is complete.

Mr. Geo. L. Phillips, assistant general manager of the American Bell Telephone Company, spent several days at telephone headquarters in this city last week.

The stockholders of the Missouri and Kansas and United Telephone Companies will hold their annual meeting February 20, an adjournment to that date being decided upon.

This city is on the eve of an explosion. The manager of the Kansas city exchange happened into the office of the cashier of the Citizens' National Bank recently, and was met with the abrupt statement:

"I wish you would take our telephone out!"

"We study to please," was the reply of the astonished manager, "and shall certainly do as you wish. But why do you want your telephone removed?"

"Simply because we have no excuse for 'cussing' it, and now that this general safety valve for surplus profanity has become a thing of the past, a decided feature of the telephone service is lost to its patrons. I have heard others complain of the same thing, and if the hundreds of telephones that in times past carried off with ease all the surplus of profanity can not be 'cussed' with justice any more, there is liable to be an explosion."

The banker was invited out, and his grief partially assuaged in a glass of lemonade.

BI-POLAR.

It is announced that the Keely motor is complete—almost—and that the engine will be shown in motion in a few weeks—perhaps. "It is on," exclaimed each of Cinderella's sisters, when trying on the glass slipper—"all but the heel!"

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## The Electric Launch as it Is.

The possibilities of electric propulsion for launches is, very naturally, exciting much interest. If the electric launch is successful from an economical standpoint; that is to say, from a commercial standpoint, it is by no means difficult to imagine in the not distant future a great steamship being propelled across the ocean by means of a somewhat similar application.

Hence, it is with not a little disappointment, we are compelled to confess, after a careful and laborious study of the electric launch, that though it contains all the elements that go to make up a scientific success, it has not yet reached a point where it can compete, so far as cost is concerned, with the steam launch. It is a disappointment that this is the case, because it is so superior to the steam launch. It moves easily and quickly; it has no smoke-stack, vomiting forth smoke and cinders; it is noiseless. There is no cumbersome engine, which, if upright, endangers the equilibrium of the vessel, and, if horizontal, demands nearly all the boat for itself. Given the same power, the electric launch will carry forty persons where the steam launch will carry only twenty-two. The batteries of an electric launch may either be hid away under the seats, or they may be laid on the keelson as ballast.

When we speak of electrical launches, we do not refer to those operated by primary batteries, for they are so expensive as to be altogether out of the question.

We have no less an authority than Mr. Reckenzaun for the assertion that the cost of steam, secondary and primary batteries is respectively 1, 2.5 and 12, which thus leaves the ordinary zinc battery out.

As will be seen, if the cost of the secondary battery electrical launch is to the steam launch only as 2.5:1, it makes it by no means impracticable, but it must of a necessity be restricted to the use of the wealthy. Of course we do not wish to imply that steam launches are within the reach of the poor, but that where small marine motors are required for unimportant ferries—and many such are used within American waters—the steam launch, and not the electric launch, is likely, at least for some time to come, to be in demand.

But to those who can afford the extra expense of electricity the electric launch has much to offer in point of superiority.

The relative expense of the steam and electric launch, as laid down by Reckenzaun, is, it should be remembered, based upon the present facilities for generating electricity and charging the accumulators. But, if we take into consideration the possibilities—indeed, the probabilities—of the near future, this 2.5 might be reduced very much.

Mr. Marcel Deprez has shown us that electrical energy may be transmitted economically to a distance over an inexpensive wire, and should this system be perfected, and regular charging stations be established upon the banks of a river like the Hudson or East Rivers, for instance, who is bold enough to deny that the electric launch would not reach a point of economy bordering very closely upon the steam launch?

Mr. Reckenzaun, who, it will be remembered, made some very unique and interesting experiments with electric launches at Vienna recently, read a paper upon the subject before the English "Society of Arts." In this he gave much important data concerning secondary batteries as applied to launches. He says that a Faure-Sellon-Volckmar cell weighs 56 pounds; stores energy equal to one horse power for one hour, or 1,980,000 foot pounds; or, say one horse power per minute for each pound weight of the cell.

The charging capacity is as much as 370 ampère hours, but it is not advisable to use more than 80 per cent., or 300 ampere hours. If the cell is discharged at the rate of 40 amperes, an almost constant current is obtained for 7½ hours, with an E. M. F. of two volts. If one horse-power is required for that time and at that rate of discharge, more than nine cells are wanted; but 47 cells will supply five electrical horse-power, and will weigh 2,632lb. About half the number of cells discharged at a rate of 80 amperes will supply the same quantity of energy, but only for less than half the time; or the 47 cells can, if desired, be made to give ten or twelve electrical horse-power for over two hours. To the weight of the battery 2,632 pounds have to be added, that of the motor, which need not weigh 400lb., says Mr. Reckenzaun, if economically designed, and which will give four horse-power on the screw-shaft. Allowing a margin for leads, switches, &c., the total weight is about 28cwt., which Mr. Reckenzaun says is equivalent to that of an equally powerful steam-engine with the maximum stowage of coals. The launch sent to the Vienna Exhibition, which made many successful voyages on the Danube, is of steel, 40ft. long and 6ft. beam, with seats to accommodate 40 adults. The motor is capable of working up to 7 horse-power with 80 accumulators, but with the exception of a slight rise just above the motor, the floor is quite clear, the accumulators and engines being underneath out of sight. In such a launch, driven by steam power, the engine and boiler would occupy a length of 12ft., leaving only 15ft. available for seating passengers, whereas the seating capacity of the electric launch is 27ft. on each side of the boat. The relative weights of machinery are about the same—viz: 50cwt.; but in the case of the steam launch that includes 10cwt. of coals, which, at 8lb. per i. h. p. per hour (7 h. p. actually given to the shaft), would allow of 15 hours' continuous steaming, or just double the time that the launch could travel without injuriously drawing on the accumulators.

The present accumulators yield 33,000 foot-pounds per pound of lead. Theoretically, lead separating from its oxide manifests energy equal to 360,000 foot-pounds, while the figures for iron are 1,900,000 foot-pounds. It is evident, then, that although nothing like those figures can be reached, there is a very large margin for the future advance of inventors with secondary batteries; but it is doubtful whether much more can be done with the motors, especially as Mr. Reckenzaun exhibited one of his inventions, just finished, which, with a weight of 124lb., yields 1·37 mechanical horse power, running at 1,350 revolutions, and giving 31 amperes and 61·5 volts at the terminals. In connection with electric launches, the old debates as to the efficiency of the screw propeller are likely to be re-opened, for in them the propeller is fixed on a prolongation of the motor shaft, and it consequently revolves at a very high speed. According to Mr. Reckenzaun, a fine-pitched propeller he exhibited gave an efficiency of 95 per cent. when running at 800 revolutions per minute. In the course of the discussion that followed the reading of the paper, it was pointed out that it was a fallacy to suppose that slip in itself was a loss, and the 5 per cent. lost by this propeller did not give any idea of the efficiency. To that Mr. Crohne (of Messrs. Yarrow) replied that such a pitch, about 10-in. to a diameter of 20., was unknown before, and he had been of the opinion that it would not do at all. He expected that negative slip and friction of the propeller would make a serious impediment; but when the experiments were made he found he was entirely mistaken. Mr. Reckenzaun said that the propeller was designed to run at 900 revolutions; and that if the speed were reduced to 300, not only would the pitch have to be altered, but the surface would have to be larger, which would entail more friction. The performance of this propeller is, in fact, a revelation, and it is to be hoped that before long some experiments will be made on a larger scale in steam vessels. The number of strokes made per minute by the pistons in fast-steaming vessels ranges from, say, the 133 of the Stirling Castle to about 1,000 in some of the torpedo boats; but as revolutions of the screw is the point to be studied, it will be seen that the electric launch is far ahead of anything known in connection with steam-engines.

The Storage Battery is rapidly coming to the front, as will be noted elsewhere in this edition.

## The Antidote with the Poison.

These ingenious persons, the managers of the Western Union Telegraph Company, who long ago inaugurated the scheme of buying up rival companies instead of fighting them, and the equally ingenious gentlemen who have been in the habit of organizing opposition, with a single purpose of permitting themselves to be bought up, are now in a quandary. The game of buying up is played out, at least in the telegraph field. The patriotic and self-sacrificing originator of telegraphic schemes, "in the interests of the public," must, perforce, take a back seat, and there is no balm in Gilead.

The fact is, the demand for cheap telegraphic facilities has so grown, and the field in this country is so wide, that several new companies, backed with large capital, are making ready to supply it.

And it is by this multiplication of rival companies that the real interests of the public is likely to be the best subserved. The malady of rank-smelling monopoly has found its own cure.

This the REVIEW has ever maintained.

When the project was first broached of forcibly taking possession of the Western Union Company's lines, and giving it for whatever the purchaser—the Government—should appraise them at, the REVIEW put forward a strong protest. When that able statesman, Senator Edmunds, of Vermont, developed a scheme to start a Government opposition to Western Union throughout the country over the main lines, and thus force it to sell at a great sacrifice—at least, to innocent holders—we again objected. We object to everything that is unfair and unjust; and again it is doubtful whether the evils of the Western Union monopoly are as much to be dreaded as would be an addition of from 50,000 to 100,000 officeholders to the already too large army of Government retainers. It seems to us that this would be but getting rid of a lesser evil at the price of a worse.

Good, healthy opposition, coming from the people themselves, is what we want to bring the Western Union Company to its senses. What is the use of prating about watered stock and the like? Will that result in giving the public its much-needed cheap telegraph service? By no means. What do the monopolists of the Western Union Telegraph Company care about the public, or its wants or its indignation either, for that matter? Nothing at all.

It is curious how a certain portion of the daily press will prate about such things when they want cheap and efficient telegraph service.

They used this same argument, too, in order to sustain an assertion that the telegraph operators should have more pay. But did it have any effect? None whatever. Why? Because a thing is worth only that which it will fetch in the open market; and, as the market was flooded with operators, the company could procure them on its own terms; else the operators might have demanded and received whatever pay they wanted. Neither the fact that the Western Union Telegraph Company had watered its stock, nor yet that the sympathies of the general public and the press were with the operators, affected the issue in any way whatever.

And so it is in the present condition of affairs. The meretricious methods employed by the Western Union Company have left it in a condition of vulnerability—naked to its enemies.

Western Union makes, according to its latest reports, nine per cent. on a hugely watered stock of eighty millions. Senator Hill's speech showed that a part of the Western Union lines cost originally $147,000, and was stocked at a million; that it was then taken into the Western Union at two millions; and that later the general stock of this Company was trebled.

The public and the press cry out against the exactions of the Western Union and its imperfect service. Yet how can they expect a company to give them cheap rates and efficient service, always expensive, when it must pay *nine per cent.* on millions upon

millions of bonds that only cost the printing. They can't do it.

But other companies, satisfied to make a moderate interest upon an absolute outlay, can do it; and, in fact, are commencing to do it.

The Baltimore and Ohio Telegraph Company is already stretching out its arms far and near; and if it cannot, when in full operation, make Western Union squeal, we shall be much mistaken.

By this we do not mean to imply that we think there is any chance of the Baltimore and Ohio Telegraph Company driving Western Union out of the field, for we do not think so, and would not wish to see it, even if it were possible, because the company that remained, finding itself unopposed, would prove just as bad a monopoly as Western Union has ever been. No. There is room for Western Union, Baltimore and Ohio, and a dozen more companies, and the more there are the better will be the chances for cheap and efficient telegraph service.

But the opposition of Baltimore and Ohio and other companies will, there is reason to believe, force Western Union to lower its rates and improve its service or shut up its shop.

There is another fine telegraphic organization which bids fair to prove another formidable opponent to Western Union. This is the Postal Telegraph and Cable Company. This company, says a Washington correspondent, has begun to lay in the streets of Washington the underground wires which are to connect its office in the center of the city with the pole line, which is now completed to the municipal boundary line, and which will presently give Washington a new telegraph connection with Baltimore, Philadelphia, New York, Buffalo, Cleveland, Chicago, St. Louis and intermediate places, and in a short time with Cincinnati, Pittsburg and the oil region.

The District Commissioners in Washington some time ago prohibited any further disfigurement of the streets by telegraph poles. It is now required that all new lines brought within the city limits shall run underground, and it is intended to abolish the pole nuisance entirely in a short time.

The Postal Telegraph Company has already experimented with several underground cables. Its wires enter Chicago and run to its offices there in the heart of the city under ground. They are laid in lead pipes in an iron box, and have worked without failure since last August. For river crossings the Postal Company uses gutta percha cables, with (500 pounds to the mile) copper conductors and very heavy insulation, and also the Kerite. Philadelphia will be crossed under ground with the patent lead covered cables.

The Postal Company has now in operation a through line between New York and Chicago, consisting of two copper conductors with steel cores, each 500 pounds to the mile, and one steel cored copper wire of 200 pounds. Using the Grey harmonic system, one of these heavy wires has six instruments at each end, and twelve operators to each wire, and these are able to send messages between New York and Chicago—a distance as the line runs of 1,054 miles—without repeating.

Between New York and Washington the company has run two 500 pound compound copper wires with steel core, and the whole line between the two cities will be completed and working in two weeks, with stations, to begin with, at Morristown, Clinton, Doylestown, Norristown, Conshohocken, Philadelphia, McCall's Ferry, Baltimore and Washington. The company will also probably work a through telephone line between New York and Washington, as the telephone has been proved entirely practicable for that and even greater distances, by means of the very heavy copper conductors used by this company.

It will interest the public to know that between New York and Chicago the Postal Company has already telegraph offices at Middletown, Binghamton, Owego, Elmira, Jamestown, Salamanca, Olean, Warren, Cleveland, Wellington, Auburn, Indiana, Defiance, Fostoria, South Bend, Avila and La Porte. A continuation of the postal lines between Chicago and St. Louis, with offices opened at Streator, Joliet, Pekin, Peoria, Springfield and Alton, will be completed in thirty days from now, as also a branch line from Fostoria to Toledo and another from Buffalo, by Olean, through the oil regions to Pittsburg. The company will traverse Alleghany City and Pittsburgh by means of a lead-covered underground cable.

The aggregate of lines thus soon to be completed and in operation will be 2,300 miles long, and the company is pushing on vigorously with the intention to connect, by its heavy copper covered wires, all the principal cities in the United States. A line from New York to Boston and through New England, is now under contract, and a second line between New York and Chicago, by way of Harrisburgh and Indianapolis, with a branch to Cincinnati, is to be built during the coming summer.

The extra heavy poles required by the heavy copper covered wires are run forty to the mile, and the whole equipment is of the best. Experience has already shown that this is the cheapest in the long run, as the cost for repairs is only about one-quarter that on common lines. In addition to the Grey harmonic system, which the company works, it controls also the Leggo, which it will apply for rapid automatic work, by which, on its wires, 800 words per minute can be despatched over the greatest distance on the line without repeating. Between New York and Philadelphia the company will work sixteen men on each of its large wires, eight men at each end.

Here we had what looks very much like a perfect system, and we shall be very much surprised not to say disappointed, if it should fall a prey to the two great telegraphic organizations now arming for the fray.

## The Humorist Keely.

Those impatient persons, the Keely motor stockholders, seem never to be satisfied. Mr. Keely told them a month ago that he only wanted thirty days more to perfect his little motor, and now that the time is up they really expected the old man to show up.

Of course, Keely, and possibly his little motor, too, are laughing in their respective sleeves at these unsuspecting lambs, who take even the broadest farce *au sérieux*.

The fact is, Keely is one of the most comical fellows to be found in the whole country; and when he gets a lot of real, Simon-pure verdants together, like the Keely motor stockholders, he cannot for the life of him resist having a little fun with them.

Sometimes, however, even the patience of lambs is exhausted, and the credulity even of Keely motor stockholders is severely tried. And so it is that when his stockholders demand to *see* something, and their somewhat generously-supplied extent of ears stand on end with the hectic flush of skepticism, the inimitable Keely, it is said, is never at a loss for an expedient, buys a donkey engine, perhaps because symbolic of his stockholders, and runs therefrom a small bit of shafting into the room above. "Now, gentlemen," he will say, "of course you could not expect me to show *our* motor until it is perfected, because why? Because these wicked people by whom we are, unfortunately, surrounded, would steal our invention from us, go and put out millions of dollars in exploiting it, and we should be undone." And so the stockholders, perched in an upper loft, look at the shafting moved by the donkey engine below, and are satisfied for another year, willingly putting out a lot more money to help the ambitious inventor to—to experiment with his drop of water, though, if some of his nearest friends may be relied upon, the great motor inventor does not use water except in his engine.

And how he must roar when he thinks of these gullible persons, who can stand a decade of procrastination with unfaltering faith! No doubt, there are times when Keely, having satisfactorily answered the question as to just when he will take a train of cars from Philadelphia to New York with one drop of water as fuel, almost rolls off his seat with laughter.

About a year ago, to satisfy the few of his adherents who were determined to have something tangible, it is said that Keely picked out the only man among them who is capable of appreciating a really good joke, and told him the whole story, whereat he almost burst his sides with merriment, and could never thereafter listen to Keely talking about his little motor without going into convulsions of laughter. Indeed, it is said to have taken him three days and two nights' constant effort, after first hearing Keely tell his story, to so control his muscles of risibility as to be able to appear before his brother stockholders and explain to them that Keely could get that amount of power out of a pint of water that would be sufficient to send them all skyward. And so he could, and so could they either, for that matter. But they were satisfied.

The remarkable thing about these Keely motor stockholders is that they rival Job in patience, and have the faith which we have been told on Biblical authority moveth mountains. They have been disappointed, not to say humbugged, one hundred and thirty-nine times, and yet they really expect that on the one hundred and fortieth time they will ride hither from Philadelphia behind Keely and his motor.

Only a short while ago Keely, who evidently wanted to draw more heavily than usual on the pockets of his believers, had a picture of his alleged motor published in a New York paper. It looked to us like a carbolic acid disinfecting apparatus, but we doubt if it could be made to do as valuable a work. But it sufficed to induce the lambs to permit another shearing, and there is reason to believe that they will never discover that there is no Keely motor, but only a Keely joker, until the last tuft of wool shall have disappeared from their somewhat phenomenally thick hides.

## Both Arc and Incandescent Light furnished by one Company.

The Brush-Swan Electric Light Company, of Cheyenne, Wyoming Territory, we are informed, is the first company in the United States that is supplying both arc and incandescent electric light to consumers upon the above-named system. The company was started one year, and has met with great success, when it is considered that Cheyenne is a place of but 5,000 people. The present plant of the company consists of about 150 arc lights, of which number 109 paying lights are in operation in stores and streets. The most interesting feature of the system, however, is the use of the Brush storage battery and Swan lamp for household illumination. Over 40 of the principal residences, buildings, churches, etc., were wired during the past summer and fall and prepared for the batteries, which began arriving in September. There are now in position 36 batteries, furnishing light to 26 buildings of various kinds, and this number will be augmented as fast as the batteries can be procured. The company have ordered 100 more batteries, being perfectly satisfied with the initial plant, and they express their intention to add still farther until the entire town is supplied. A noteworthy fact, which has before been disputed by competitors, is that these batteries are all charged from one dynamo during hours when it is not employed on arc lights. The charging circuit is turned in early in the morning, and is run until the batteries are filled. The success of the plant has been largely due to the liberal and energetic financial management of Mr. F. E. Warren, the president, and to the splendid practical work of Mr. E. P. Roberts, the electrician in charge. As the batteries have been some months in successful use, and give every promise of permanency, there can apparently be no question of the success of the system.

The utility and economy of the Storage Battery is being practically demonstrated daily, as will be seen in above article. It is being used successfully in other places.

## International Society of Electricians.

At the session held at the Ministry of the Posts and Telegraphs, under the presidency of Mr. George Berger, on the 21st day of December last, the members of the Executive Committee of the International Society of Electricians, at their own option, have divided themselves into six sub-committees, according to the six sections of studies established under the statutes.

It is important to know the special work of each section respectively, which was scheduled as follows:

First Section—Theoretical electricity, electrometry, lightning rods. Mr. Marié Davy, president; Mr. G. Lippmann, secretary.

Second Section—Dynamo electrical machines, transportation and distribution of the energy. Mr. Fresca, president; Mr. E. Hospitalier, secretary.

Third Section—Electric light, calorific actions. Count Th. du Moncel, president; Mr. Max. de Nasouty, secretary.

Fourth Section—Telegraphs and telephones.—Mr. E. Blavier, president; Mr. E. Sabourain, secretary.

Fifth Section—Railroad signals, electrical chronometry. Mr. M. Locwy, president; Mr. D. Napoli, secretary.

Sixth Section—Electro-chemistry, electrotherapy, etc. Mr. Jamin, president; Mr. G. Liama, secretary.

It seems unnecessary further to insist on the high character of general interest which, aside from any individual pre-occupation or financial influence, the society has given to the noble purposes of its own labors; but we ought to say that in the results of its studies and experiments the electricians of all kinds and countries will find an absolutely disinterested control, a sound appreciation of their labors, an efficacious encouragement in the pursuit and realization of their discoveries.

Lectures and public experiments, the elements of which are in preparation, will, in the largest measure possible, satisfy the needs of the special theoretical instruction, and the dissemination of the numerous applications of electricity.

This society, being desirous not to neglect any special idea, or information concerning these matters, which may have been written, appeals to the men of science of all countries who have written on electricity, and its diverse forms of utilization, to send to them copies of their works gratuitously, which will be catalogued and classified in the special library of the society.

The International Society of Electricians is now opened and in working order.

All communications should be addressed to Mr. George Berger, president de la Société Internationale des Electricians, 99 Rue de Grenelle à Paris. The *Bulletin* of the society, the first number of which will appear in the month of January, will record all the questions of general interest submitted to the study of its sections, as well as the labors of the committee.

Demands for information should be addressed to Mr. A. Sabourain, secretaire du comité, at the office of the society. We hope that our American electricians will not hesitate to join this society, and promote its interests in every respect.

## Photographic Revolution.

A CLEVELAND MAN'S WONDERFUL INVENTION—ITS GREAT PRACTICAL UTILITY.

CLEVELAND, O., Feb. 8.—Edward W. Fell, of this city, after experimenting for two years, claims to have succeeded a few days ago in perfecting an invention which its author ranks with the electric light and telephone. The invention consists of taking absolutely permanent pictures upon any substance whatever having a smooth surface instantly by the action of *electricity* upon a sensitive coating, and at an expense not exceeding one cent per picture. A reporter who called upon the inventor was shown some photographs on pieces of wood, which were not only perfect in outline and finish, but possessed a peculiar softness not obtainable by any other process.

"The importance of this discovery," said

Mr. Fell, "and its various uses, can hardly be estimated. It opens an entirely new and distinctive field in the art of photography, and will work a revolution in various branches of business into which it will enter more or less. None of the present processes are used; and it is not intended to interfere with the portrait work of the average photographer. The engraver upon wood, copper, or shell need no longer consume time and patience in obtaining a defective counterpart of the object to be engraved, but instead can, at a trifling expense, obtain a beautiful photograph directly upon the wood or metal upon which the engraving is to be made. In the lithographer's art it will be invaluable. Instead of the slow, laborious and defective process now employed in transferring by hand the article will be photographed directly upon the stone to be engraved, and the result will be a fine, complete, finished class of work heretofore utterly unobtainable."

### The Great Southern.

The Great Southern Telephone Company is pushing the work of laying the line up the coast with great vigor. The extreme limit of Plaquemines Parish has been reached, and ere the end of the week there will be communication between Port Allen and New Orleans.

The company is fixing to erect a new line on this side of the river between New Orleans and Baton Rouge; because of the great rush of business on the present line. A five-wire cable has been ordered to cross the river at Baton Rouge.

In the telephonic interference case now pending in the Interior Department the Secretary has refused the appeal of Drawbaugh to have certain parties thrown out of interference. He holds that Drawbaugh's application is for an invention substantially the same as that embraced in the patents of Blake and Edison, and that the question of priority of invention between the parties must be determined by the interference proceedings.

### The Lifting Power of Electricity.

The February meeting of the American Astronomical Society was held in Packer Institute, Brooklyn, last evening. A paper was read by Mr. G. D. Hiscox on the subject of electricity as a cosmic element. He deduced from various phenomena the conclusion that the subtle and imperfectly understood counter-gravitation force in the universe, the nature of which had caused so much discussion, but whose existence was almost universally admitted, was none other than electricity. Electric repulsion counteracted the power of gravitation, and explained the eccentric sweep of the tails of comets from their orbits: which phenomenon has never been understood.

Prof. P. Cassamajor, a chemist of this city, spoke of the glow in the morning and evening sky. He advanced the theory that a ring of gaseous matter similar to those encircling Saturn, was being formed around the equator of the earth. He said that the effect of such a ring would be to produce a white light in the sky toward the end of June, and that the appearance of such a light would be a confirmation of his theory.

During the discussion a member remarked that the view was unobstructed on Pike's Peak at a short distance from the earth's surface, but at a certain height it was impeded by a fixed gray, dusty cloud.

The Armington & Sims Company received the first prize for the best high-speed engines for electric lighting at the Louisville Exposition. In this class were the Porter-Allen, Payne, and Westinghouse engines. The Cummer did not come in competition with any of the other engines mentioned; and, although it received a prize in its class, it is the opinion of many competent engineers that the judges gave the diploma of honor to the wrong engine.

*Editor Electrical Review:*

As one of your patrons and a constant reader of your valuable paper from which I have derived much valuable information, and having for the past twenty-seven years been largely engaged in the production of the electric current by power, it may not be uninteresting to your readers to have some light thrown upon the question who first invented the iron ring or cylinder now so generally used in dynamo organizations, forming an endless iron cone for all the spools or bobbins of a series arranged in a circle.

Will you do me and the public the favor of publishing in connection with the above the following claim in my patent granted June 18th, 1861, which anticipates any other claim for the same invention nearly ten years? The claim reads as follows:

"What I claim as constituting this part of the invention is, *connecting* the *cores* of *spools, coils,* or *helices* in magneto-electric engines *by a ring* of *soft malleable cast-iron* or *wrought-iron,* or any *equivalent substance* possessing the property of readily taking and discharging magnetism for the purposes specified."

GEO. W. BEARDSLEE.
314 Greene ave,, Brooklyn.

Electric lighting in Europe is advancing more rapidly than the American public seem to realize. Gas is usually far poorer in quality than here, and modern improvements in making it are slowly adopted. The Bon Marche, at Paris, where 1,500 clerks are employed, tried 400 electric lamps, and has now increased the order to 2,000. The St. Lazare railway station tried a few lamps in the vestibule and will now extend the system to the whole vast establishment, covering some twelve to fifteen acres. The Grand Opera House, at Paris, with its 1,100 permanent employes, has a gas bill of $60,000 a year, and it has been experimenting for the last two years with almost every known system of electric lighting, American or otherwise. In Milan, the Manzoni Theatre is lighted by electricity, and the vast theatre, La Scala, now has a complete equipment of engines, boilers, and dynamo machines from New York, adequate to 10,000 lamps, in position under the shadow of the great cathedral, without so much as a wire or a puff of steam in sight from the cathedral itself.

The Boulton Carbon Company, of Cleveland, seem to have taken a place in the front rank in the carbon business. This is not entirely due to the superiority of their carbons for electric lighting, but also to the energy of their able representative, Mr. Mr. G. S. Wadsworth, who never seems to tire in his good work.

The Armington & Sims Engine Company have just delivered to the Slade Mills, at Fall River, Mass., a 160-horss power engine, and to the Russell Paper Company, at Lawrence, Mass., one 200-horse power and one 80-horse power engine, and are also building a 200-horse power engine for the Arlington Mills, at Lawrence. This speaks well for these deservedly popular engine makers.

It is reported that a duplex system of telegraphy is to be applied to the new Atlantic cable. If this can be accomplished, it will double the capacity of each line; and, as the ocean cables are very costly, will be of great value and advantage, provided there is business enough to require two lines at any hour of the day. A new system of multiplex telegraphy, to use Morse instruments on long lines, has recently been invented in this country, and a line is being built on which to make practical tests. There are other systems for effecting the same purpose, but for one reason or another they have failed to give perfect satisfaction. The quadruplex is the highest system practically employed with Morse sounders.

Why is the telephone salutation like the future of the wicked? Because it is hell-o.—*Major D, Old Guard.*

## ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING FEBRUARY 5, 1884.

292,785 Apparatus for operating electrical devices; A. Livingston Bogart, Jamaica, N. Y.

292,786 Electric gas lighting attachment for burglar alarms; A. Livingston Bogart, Jamaica, N. Y., assignor to Abraham L. Bogart, same place.

292,796 Protector for electric circuits; Josiah W. Dyer, Philadelphia, Pa.

292,806 Electric burglar alarm; James P. Hanson and James P. Christensen, Chicago, Ill.

292,807 Electric burglar alarm; James P. Hanson and James P. Christensen, Chicago, Ill.

292,835 Apparatus for telephonic transmission; Jacob F. Mehren, Chicago, Ill.

292,840 Voltaic arc lamp; Otto A. Moses, New York, N. Y.

292,847 Aerial cable; W. R. Patterson, Chicago, Ill., assignor by mesne assignments to Western Electric Company, same place.

292,848 Terminal box for telegraph cables; W. R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.

292,849 Telephone cable terminal; W. R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.

292,857 Gas and magnetic telephone system; Jas. Harris Rogers, Washington, D. C., assignor to the American Electro-Gas Telephone Company, of New Jersey.

292,865 Condenser and test circuit for multiple switchboards; Charles E. Scribner, Chicago, Ill, assignor to the Western Electric Company, same place.

292,866 Testing apparatus for multiple switchboards; Charles E. Scribner, Chicago, Ill, assignor to the Western Electric Company, same place.

292,881 Speaking telephone; Francis Ware, Boston, Mass.

292,930 Electric motor; A. E. G. Lubke, New York, N. Y., assignor of one-half to Otto Heikel, Jersey City, N. J.,

292,962 Device for synchronizing clocks; Charles N. Talbot, Flushing, N. Y.

292,966 Printing telegraph. Henry Van Hoevenbergh, Elizabeth, N. J.

292,922 Alarm signals for hot journals; Oliver H. P. Cornelius and George H. Turner, Turner, Oregon.

292,999 Signaling apparatus for telephonic and telegraphic circuits; Lorenzo S. Fairbanks, Boston, Mass.

293,076 Electric lamp; Ludwig Piette and Franz Krizik Pilsen, Austria, Hungary.

293,105 Circuit closer for telegraph keys; Samuel J. Spurgeon, Houstonia, Mo.

293,110 Automatic telegraph; Theo. F. Taylor, Chicago, Ill.

293,111 Automatic telegraph system; Theo. F. Taylor, Chicago, Ill.

293,116 Electro-magnet and armature; Ilius Augustus Timmis and Stanley Charles Cuthbert Currie, London, England.

293,118 Telephone call-bell switch; Louis Townsend, Evansville, Ind.

293,136 Telephone case; Park Benjamin, New York, N. Y.

293,154 Telephone; Daniel Drawbaugh, Eberly's Mill, Pa.

293,160 Driving gear for magneto-electric machines; Ezra T. Gilliland, Indianapolis, Ind., assignor to the Western Electric Company, Chicago, Ill.

293,161 Telephone apparatus; Ezra T. Gilliland, Indianapolis, Ind., assignor to the Western Electric Company, Chicago, Ill.

293,162 Telephone apparatus; Ezra T. Gilliland, Indianapolis, Ind., assignor to the Western Electric Company, Chicago, Ill.

293,171 Telephone circuit changer; Charles D. Haskins, New York, N. Y., assignor by mesne assignments to the Western Electric Company, Chicago, Ill.

293,196 Night signal circuit for telephone exchanges; Charles E. Scribner, Chicago, Ill., assignor by mesne assignments to the Western Electric Company, same place.

293,197 Annunciator switch and telephone circuit; Charles E. Scribner, Chicago, Ill., assignor by mesne assignments to the Western Electric Company, same place.

293,198 Telephone switch; Charles E. Scribner, Chicago, Ill., assignor by mesne assignments to the Western Electric Company, same place.

293,206 Looping mechanism and operators' apparatus for telephone exchanges; Eugene M. Wilson, Worcester, Mass., assignor of one-half to Alice P. Carpenter, Foxcroft, Me.

**A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.**


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| " " Jars | 25c |
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| " Coppers | 18c. |
| " Jars | 25c. |
| Sal Ammoniac, per lb | 12½c. |
| Blue vitriol, per lb | 6½c. |
| " " bbl., lots, per lb | 5½c. |
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| Empire State Telephone and Telegraph Company | 198 | 189 |
| Hudson River Telephone and Telegraph Company | 100 | 92 |
| New York and New Jersey Telephone Company | 86 | 74 |
| Mexican Telephone Company | 2½ | 2¼ |
| New York and Pennsylvania Telephone Company | 76 | 67 |
| Southern Bell Telephone and Telegraph Company | 125 | 120 |
| Tropical Telephone Company | 2 | 2½ |
| Central Union Telephone Co. | 100 | 97 |
| Iowa Union " " | 96 | 89 |
| Missouri and Kansas Telephone Co. | 98 | 94 |
| United Telephone Co. (Kansas and Missouri) | 99 | 96 |
| Bell Telephone Company, of Missouri | 160 | 156 |
| Wisconsin Telephone Company | 120 | 115 |
| Cumberland Telephone Co. | 100 | 97 |
| Great Southern Telephone Co. | 100 | 95 |
| Michigan Telephone Company | 105 | 100 |
| Chicago Telephone Company | 282 | 280 |
| Erie Telephone Company | 39 | 35 |
| Union Telephone Company | 100 | 95 |
| Southern New England Telephone Company | 165 | 160 |
| New England Telephone Co. | 53 | 45 |
| Chesapeake & Potomac Tel. Co. | 100 | 97 |

One of those grand opportunities for getting off the joke about editing a newspaper with the scissors, which only presents itself to the editor's friends forty or fifty times in a lifetime, is now at hand. Timothy Crimean has just died in a Philadelphia hospital of wounds inflicted on himself with a pair of scissors. It will be suggested that he mistook himself for an "esteemed contemporary," or that it was remorse at having clipped without giving credit. Exchange editors of scissitive natures should be prepared for almost anything of this sort.—*H. B. L., Old Guard.*


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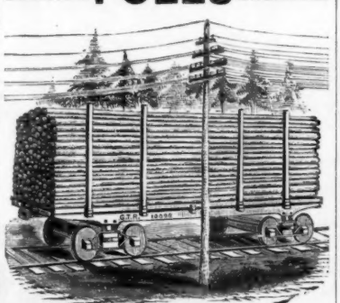

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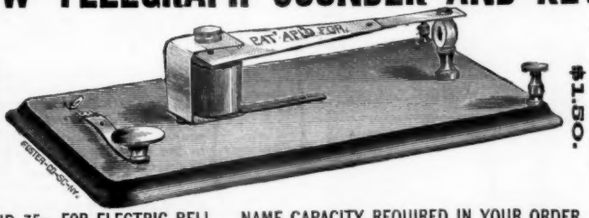


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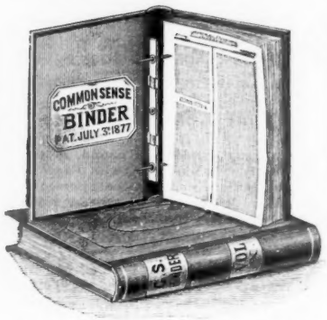


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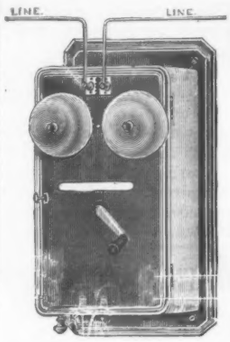


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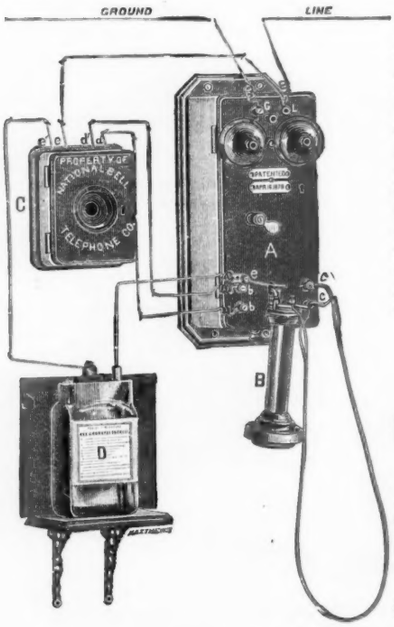


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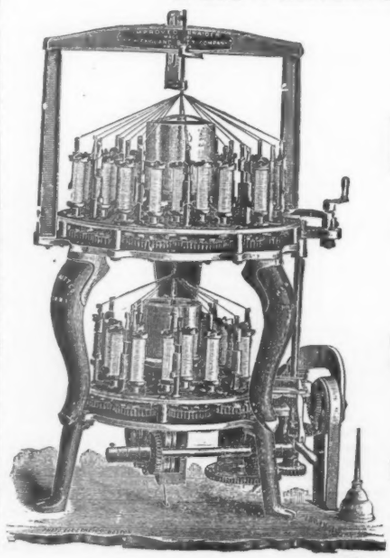

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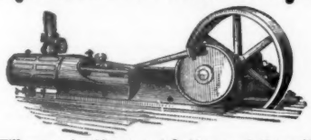

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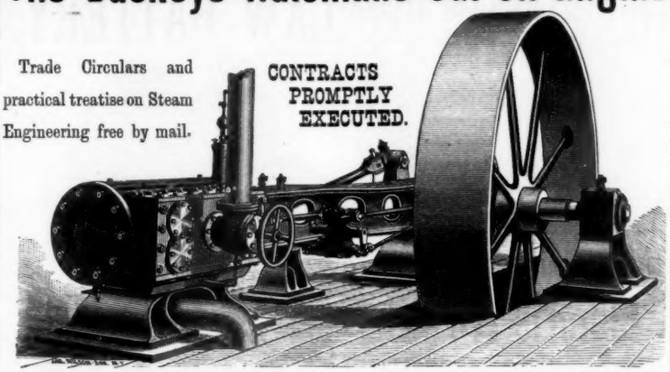

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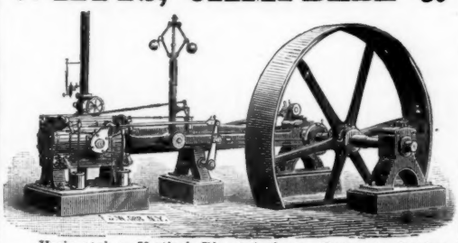

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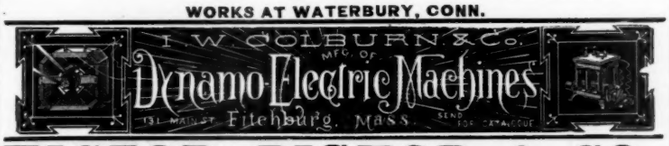


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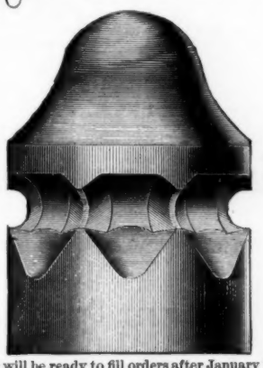

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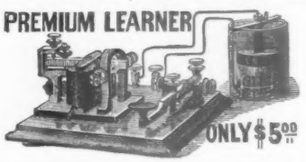


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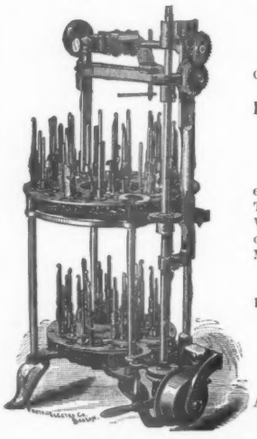

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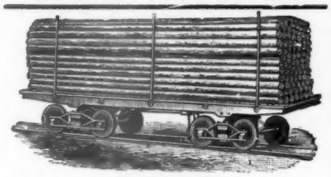

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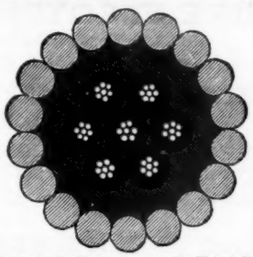

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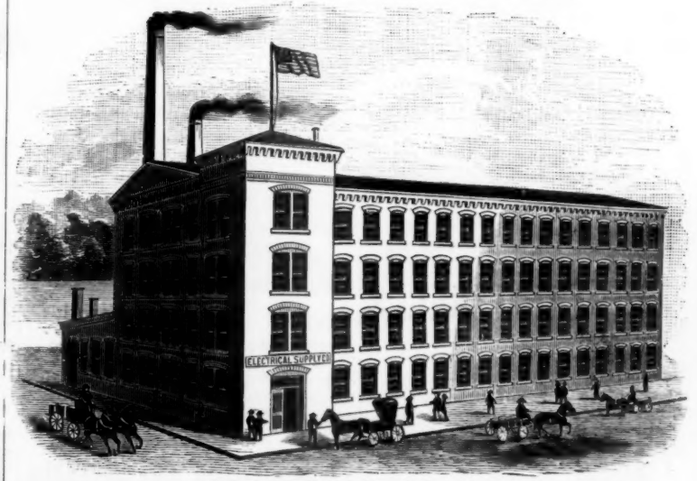


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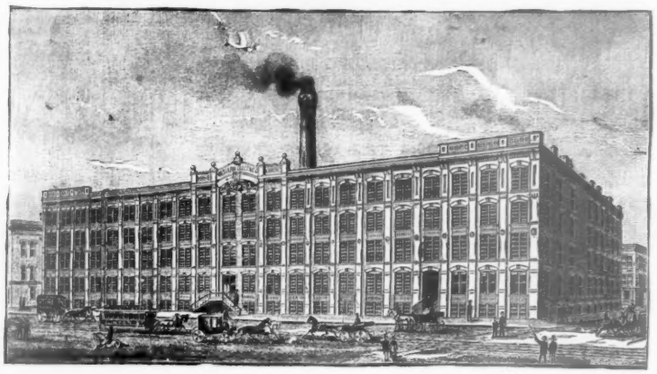

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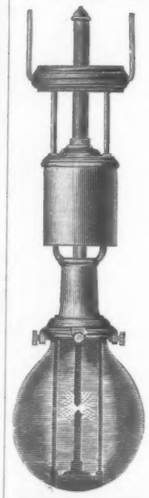

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